



# CHEMICAL ABSTRACTS

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## 1—APPARATUS

C. G. DERRICK

**Report of the testing committee of the division for chemical apparatus, section for laboratory apparatus.** ANON. *Z. angew. Chem.* 35, 142-4, 145-51(1922).—*Beakers, glass dishes, watch glasses, flasks.* Cuts show the form of the different types of app., and tables give the dimensions, capacity, thickness of walls, etc. J. H. MOORE

**Decision of the testing committee of the division for chemical apparatus, section for laboratory apparatus.** ANON. *Z. angew. Chem.* 35, 154-5(1922); cf. preceding abstract.—*I. Laboratory stand.*—Stands with rectangular base to be 100 × 150, 130 × 230, and 150 × 300 mm. dimensions, and rods to be 500, 700, 1000, and over 1000 mm. length, and to be interchangeable. Of the 2 types of tripod base only the common (not enlarged) foot is retained. *II. Thermometer.*—A table gives the range and division of scale, and length and diam. of stem for common lab. thermometers. J. H. M.

**Apparatus for rapid determination of the specific weight of small quantities of liquids.** REICH WIEDBRAUCK. *Z. anorg. allgem. Chem.* 122, 167-70(1922).—Two interchangeable U-tubes are connected through a Greek cross shaped (+) tube on opposite ends of which are two stopcocks. Water is placed in one U-tube and the liquid to be measured in the other. The height to which the two liquids rise, when subjected to the same pressure or vacuum, is read on a mm. scale and the ratio of these values gives the sp. wt. Compared with the exact hydrostatic and pycnometer methods, the sp. wt. detd. in this way showed an error of not more than 0.2%. H. M. M.

**New apparatus for the measurement of the polarization capacities of platinum plates in sulfuric acid.** A. GRIFFITHS AND W. T. HEYS. *Proc. Phys. Soc. (London)* 34, 169-74(1922).—The method makes use of a falling plate for making connection of short, variable, and calculable periods, thus allowing corrections to be made for the leakage and self-polarization of the cell. The results obtained are consistent to within 2%, and are of the same order of magnitude as those obtained by other observers.

C. C. VAN VOORHIS

**Apparatus for the electrical determination of melting points by Uytenbogaart, Jr.** ANON. *Chem.-Ztg.* 46, 493(1922); 1 cut.—The app. resembles a hollow glass ring with a tubular connection across 1 diam., the connection being extended upward to form the neck of the app. A Pt wire passes through the app. below the tubular connection. The app. is filled with H<sub>2</sub>O, glycerol or H<sub>2</sub>SO<sub>4</sub> and the capillary tube and thermometer are inserted through the neck so as to extend about half way down the tubular connection. When the current is turned on the heated liquid rises through the sides and returns through the center, giving a very uniform temp., so that readings with an accuracy of 0.01° are made. J. H. MOORE

**Immersion refractometer with exchangeable prisms.** URZ. *Chem. Umschau* 28, 175-6(1921).—Attention is called to the new Zeiss immersion refractometer with 6 exchangeable prisms applicable to ranges 1.324-1.367, 1.366-1.396, 1.395-1.421, 1.419-1.449, 1.445-1.472 and 1.468-1.492; thus it is made available for many liquids heretofore outside of its reach. Each prism must be adjusted for zero with H<sub>2</sub>O for prism no. 1, a special liquid for no. 2, and adjusting plates for nos. 3-6. For small amts. of liquid an extra auxiliary prism is furnished. P. ESCHER

**Apparatus for direct resistance heating to very high temperatures with an arrangement for simultaneously exerting a mechanical pressure.** F. SAUERWALD. *Z. Elektrochem.* 28, 181-3(1922).—The heating element consists of a rod 11 cm. long and 0.16 to 0.36 cm.<sup>2</sup> in cross-sections. (The material of the element is not mentioned.) Mech. pressure is applied to the contents of the furnace by means of 2 solid metal cylinders which enter on opposite sides. For low temp. work these cylinders may be of Fe, but for high temps. W or C must be used. Details of construction are given by means of several diagrams. The results of expts. carried out with this furnace are to be published shortly.

H. JERMAIN CREIGHTON

**Apparatus for determination of the gases in blood and other solutions.** DONALD D. VAN SLYKE. *Proc. Nat. Acad. Sci.* 7, 229-31(1921).—The app. consists of a volumetric pipet with an upper stem closed by means of a stopcock and a lower stem connected with a glass tube which descends 800 mm., then turns at a right angle and is connected at its end through a stopcock with a leveling bulb and its tube; a Hg manometer, open at its upper end, is attached between the right angled bend and the leveling bulb. The pipet is calibrated from its stopcock as 0 cc. to hold a cc. and A cc. The a mark is on the upper stem, the A mark on the lower stem. The app. is filled with Hg. The soln. to be analyzed, followed by the reagents to liberate the gases, is admitted through the upper cock with a slight negative pressure. Then a Toricellian vacuum is created by lowering the leveling bulb until the Hg falls to A cc. The cock to the leveling bulb is closed; and the pipet is shaken until the liberated gases have established an equil. with the aq. soln.; 1 or 2 min. are usually sufficient. Hg is then admitted from the leveling bulb through the cock until the gases occupy the vol. a cc.; the height *m* in mm. of the Hg column of the manometer is then read. The zero point is detd. after expulsion of the gases from the app. or after absorption of one or more of them by introduction of a small measured vol. of a gas-free absorbent soln. (KOH for CO<sub>2</sub>, pyrogallol for O<sub>2</sub>) through the upper cock under a slight negative pressure. After removal of the gas, the pressure is lowered until the free space above the aq. soln. is a cc.; and the height *n* in mm. of the Hg column of the manometer is read as the zero point of the detn. The vol. *V* of the gas (at 0°, 760 mm.) contained in the soln. analyzed is calcd. from the equation  $V = a(m - n)/760 [273/T + Sa/(A - S)]$  in which *T* is the abs. temp., *S* the vol. of aq. soln. in the app., and *a* the soly. coeff. of the gas in the soln. (cc. gas reduced to 0°, 760 mm. dissolved by 1 cc. of soln. in equil. with the gas at a tension of 760 mm.). The term  $Sa/(A - S)$  is a correction for the gas remaining in soln. when equil. is reached; it may be negligible for the less sol. gases like O<sub>2</sub> and N<sub>2</sub> but not for CO<sub>2</sub>.

JOSEPH S. HARBURN

**An improved form of gas-analysis apparatus.** E. W. BLAIR AND T. SHERLOCK WHRELER. *J. Soc. Chem. Ind.* 41, 187-8T(1922).—The app. described is a modification of the Bone-Wheeler app. in which the movable Hg reservoir is replaced by a fixed one; the Hg is caused to flow into or out of the gas buret by means of connections with compressed air and vacuum. The H-O mixt. for the explosion pipet is obtained from a small electrolytic gas generator which forms a part of the app. There are other minor modifications of the original app. designed to render the technic of analysis more simple and rapid.

DONALD W. MACARDLE

**Simple, foolproof carbon combustion apparatus.** WILLIAM KUEBLER. *Chem. Met. Eng.* 27, 30(1922).—A more consistent pressure and less frequent changing of the purifying train are the chief advantages of this set-up.

D. E. SHARP

**A simplified air analysis apparatus.** D. T. HARRIS. *Proc. Physiol. Soc., J. Physiol.* 56, xxi(1922).—The advantages of the app. are (1) elimination of rubber connections; (2) it has only 1 stopcock.

J. F. LYMAN

**Apparatus for facilitating glucose determinations by titration with permanganate**

according to Mohr-Bertrand. J. VAN DER HAAR. *Arch. Suikerind.* 30, 213-6(1922).—This app., a drawing of which is shown, consists of a 500 cc. round flask in which the pptn. is carried out. When this is completed the supernatant liquid is, by applying suction, siphoned slowly through a Soxhlet tube into a 800 cc. bottle which has the same size neck as the round flask. The ppt. is washed with hot water, flowing into the flask from a funnel; at first the liquid level in the flask is kept const., and then the wash water is siphoned off almost down to the ppt. The Soxhlet tube is removed from the bottle and placed on the flask. A little  $\text{Fe}(\text{NH}_4)(\text{SO}_4)_2$  soln. is now run through the siphon into the Soxhlet tube and the remainder poured directly into the tube itself. After washing the tube with water, it is removed; the contents of the flask are acidulated with  $\text{H}_2\text{SO}_4$  and titrated with  $\text{KMnO}_4$  as usual. F. W. ZERBAN

Apparatus for determining the volatility, blistering and adhesion of asphalt on metal, by J. W. H. Uytendogaart, Jr. ANON. *Chem.-Ztg.* 46, 565-6(1922); 1 cut.—The app. consists essentially of a naphthalene bath by which the asphalt is heated in a porcelain crucible to det. the volatility, and in a steel crucible to det. the adhesion and tendency to blister. J. H. MOORE

Quantitative gas-evolution apparatus for volumetric determinations. JOSEF HUBER and HANS HALLER. *Chem.-Ztg.* 46, 566(1922).—Attached to the side of the wide-mouth evolution flask is an inverted pear-shaped bulb, the lower end of which connects to the bottom of the flask by means of a tube with glass cock. The upper part of the bulb connects to the flask near the top, and the neck of the bulb carries a tube with glass cock. The substance is placed in the flask, the bulb filled with acid, the flask connected to the measuring buret and the acid allowed to flow from the bulb into the flask. J. H. MOORE

Standard dropping pipet. HEDE HALPHEN. *Pharm. Zentralhalle* 62, 767-8 (1921).—A pipet which will deliver 20 drops of water per g. should have an orifice 3 mm. in diam. (external measurement); such a pipet can be made by drawing out a glass tube at one end and passing this narrow portion as far as it will go through a 3 mm. hole drilled in a brass plate. The tube is then cut exactly at the surface of the plate. J. C. S.

Pipets. VERNBY STOTT. *J. Soc. Glass Tech.* 5, 307-25(1921).—Pipets should be adjusted for a particular time of delivery, and when testing pipets it is important to record both the time of delivery and the capacity. The time required for the delivery of the contents of the pipet should be within certain limits, since pipets are untrustworthy if the time of delivery is too short and also if it is too long. A definite time should be allowed for drainage when graduating, testing, or using pipets. J. C. S.

A simple type of glass pressure bottle. R. R. REED. *Chem. Met. Eng.* 26, 1164 (1922).—This pressure bottle is easily made from a soda-water siphon and some pipe fittings. It will stand pressures of 150 lb. per square in. D. E. SHARP

The extraction of small quantities of liquids in the Soxhlet extraction apparatus. HEINRICH HANDORF. *Z. angew. Chem.* 35, 257-8(1922).—Cuts show 2 devices for insertion into the common type of app. in order that it may be used to ext. small quantities of solns., 1 device to be used when the solvent is lighter, the other when it is heavier, than the soln. Tables show the accurate results from both devices. J. H. M.

Schneider's new atomizer. ANON. *Chem.-Ztg.* 46, 570(1922).—The app. resembles an inverted U-tube with a neck at the top and the lower ends of the legs sealed. Through the side of each leg passes a small tube which reaches nearly to the bottom, the outer ends being drawn to a capillary point and so placed that a jet of air from a 3rd tube acts as an injector to draw the liquids from the legs, thus giving atomized mixts. of 2 substances. J. H. MOORE

New laboratory steam superheater, "Model Dargatz." H. BARNBECK. *Chem.-*



*Zig. 46*, 565(1922).—A small rectangular box with fireproof lining in which is a coil for the steam to pass through. With an ordinary Bunsen burner steam may be raised from 100° to 260° in 5 mins., to 420° in 10 mins., to 450° in a few mins. longer, and the temp. held const. for hrs.

J. H. MOORE

Standardization of an electric resistance thermometer. J. GILLIS. *Bull. soc. chim. Belg.* 30, 51-7(1921).—The resistance was detd. at a no. of standard thermometric points. The correction  $b$  was then calcd. for each point by means of the formula  $aR = T - b$  when  $R$  = the resistance at the abs. temp.  $T$  and  $a = (T_1 - T_2)/(R_1 - R_2)$  where  $T_1$  and  $T_2$  = the abs. temps. of the extremes and  $R_1$  and  $R_2$  = the corresponding resistances. A correction curve was then plotted.

WM. STERICKE

New aids to heat economy in plant operation. E. STACH. *Arch. Wärmewirtschaft* 3, 43-8(1922).—A review of new (German) industrial thermometers, radiation pyrometers, flue gas analyzers, and pressure gages.

DONALD W. MACARDLE

A reagent-bottle siphon. C. A. JACOBSON. *J. Ind. Eng. Chem.* 14, 731(1922); illus.

E. J. C.

Distillation of strongly frothing substances. KLÄNHARDT. *Chem.-Zig. 46*, 493 (1922).—The foam is broken up by passing CO<sub>2</sub> from a cylinder through a bulb, about 2 cm. diam. and having 3 circles of holes about 1 mm. diam., on the end of a tube passing through the 2nd hole in the stopper, the bulb being held a short distance above the liquid.

J. H. MOORE

Gas mixer. W. W. CUMMINGS. U. S. 1,421,130, June 27. Fans of different sizes impel gases to a mixing pipe or chamber.

Centrifugal apparatus for removing suspended matter from gases. J. P. FISHER. U. S. 1,420,986, June 27.

Apparatus for ozonizing water or other liquids. S. Held. U. S. 1,420,838, June 27.

Furnaces. A. SMALLWOOD. Can. 220,408, July 4, 1922.

Furnace for pulverized fuel. L. H. BERGMAN. U. S. 1,421,898, July 4.

Scraping apparatus for furnaces. A. MAXWELL. Can. 220,374, July 4, 1922. A longitudinally disposed flat supporting base has a primary scraper secured thereto and a secondary scraper secured to the base and the primary scraper.

Apparatus for testing the porosity of sand molds and cores or other materials. C. BUBERL. U. S. 1,421,903, July 4. Porosity is tested by the rate of escape of air through the material under test.

Filter for ultramicroscopic particles. R. ZSIGMONDY. U. S. 1,421,341, June 27. A filter adapted for retention of bacteria or suspended colloidal substances is prepd. by dissolving nitrocellulose in acetone and glacial HOAc, pouring the soln. on glass plates and, after evenly spreading in a horizontal position, allowing it to dry in an atm. of 60% relative humidity at a temp. of about 18° and then washing the dried membrane in H<sub>2</sub>O.

Filter. JIN INOUE. Jap. 39,540, Aug. 15, 1921. A drum, the surface of which is perforated and covered with filter cloth, revolves in a closed chamber. A soln. is introduced into the chamber and filtration is conducted by the pressure of air or other gas introduced into the chamber. The residue is removed from the cloth on the top of the drum by a scraping edge.

Automatic press for manufacturing briquets. YASUTAKE YASUBA, TSUNEKICHI OHARA and the MATSUMOTO SHÔJI KABUSHIKI KAISHI (the Matsumoto Commercial Co.). Jap. 39,491, Aug. 9, 1921.

Apparatus for crushing and drying. SEKIJIRO SEKIKAWA. Jap. 39,460, Aug. 3, 1921. Steam-heated rolls are enclosed in a heated drum.

## 2—GENERAL AND PHYSICAL CHEMISTRY

W. E. HENDERSON AND EDWARD MACK

**The life and works of J. J. Théophile Schloesing.** L. LINDET. *Bull. soc. chim.* 31, 449-58(1922). E. H.

**René Bohn.** E. NOELTING. *Helv. Chim. Acta* 5, 566-70(1922).—Obituary. E. H.

**In memory of Prof. Guareschi and of his students who fell in the war.** *Giorn. farm. chim.* 71, 86-107(1922).—Memorial addresses by Prof. Mattiolo and Prof. Mascarelli. A. W. DOX

**Progress in colloid chemistry in 1918.** E. KINDSCHER. *Fortschritte Chem.* 16, 61-72(1920). C. C. DAVIS

**Recent advances in science—Physical chemistry.** W. E. GARNER. *Science Progress* 16, 537-41(1922).—Review of recent work on thermochemistry, the oxidation of P, and the law of the distribution of colloidal particles in colloidal solns. J. S. H.

**International Union of Pure and Applied Chemistry. Belgian Bureau of Chemical Standards.** J. TIMMERMANS. *Bull. soc. chim. Belg.* 30, 41-6(1921).—The Bureau specializes on pure org. liquids. WM. STERICKER

**The evolution of chemical terminology. II. Phototropism. Organotropism.** J. F. COUCH. *Am. J. Pharm.* 94, 343-7(1922); cf. *C. A.* 16, 1520.—The terms phototropism, geotropism, chemotropism, etc., as used by biologists and biochemists to describe true tropistic behavior should be discarded in favor of the preferable terms, phototaxis, geotaxis, chemotaxis, etc. The term phototropism as used by the photochemist to describe the reversible isomeric changes produced by light energy may be retained as such. The chemotherapeutic terms organotropism and neurotropism should either be discarded or should be changed to organophilism and neurophilism. The word tropism is retained as the generic term for phenomena of true tropistic behavior. **III. The "micella."** *Ibid* 470-7.—The history of the term "micella" is related. The various conceptions of the nature of this unit are considered and the conflicting views already published are stated. The modern English form of the term is erroneous; it not only does not truly represent Nageli's original terminology, but it also violates classical good taste. The probability of confusion arising in chem. literature through the use of the term in essentially different senses is pointed out. An acceptable definition is suggested. W. G. GABSLER

**The New International Commission on Chemical Elements.** BOHUSLAV BRAUNER. *Chem. News* 123, 230-232(1921).—B. recommends to the New International Commission that the term "atomic masses" be used only for the whole numbers of the isotopes *B* as detd. by the physical (Aston's) method, and that the term "atomic weights" be applied to the numbers obtained by chem. methods, no distinction being made between pure elements, mixts. of isotopes, or single isotopes. He also proposes to call the subcommittee of the "International Commission on Chemical Elements" a "Sub-Committee for Atomic Weights." J. C. S.

**Science in the Philippines.** J. C. WITT. *Science* 55, 197-200(1922).—The advantages and disadvantages of research in the tropics are discussed. J. C. WITT

**Restricted movements of molecules at very low pressures: a limit of the applicability of the second law of thermodynamics.** ARTHUR FAIRBOURNE. *Phil. Mag.* 43, 1047-56(1922).—The second law of thermodynamics applies to the av. velocities and energies of all the mols. in a gaseous system. It has long been recognized that if an app. could be constructed to sep. mols. of different velocities a temp. difference could be established and work could be performed in a way not in accord with

the second law. While it may be impossible to devise an app. to segregate mols. differing in velocity, it is possible to effect a directional sepn. The present paper discusses sepn. by means of small truncated cones of dimensions and at pressures where mol. encounters within the cone become negligible. Mols. entering the large end of the cone nearly enough co-axial to it would pass through without striking the wall, while those entering off-center or at greater angles would be deflected so as to pass out the entry end again. A difference of pressure would thus be set up which could be made to operate a vane placed at the exit end. The result is to be accepted with some caution.

S. C. LIND

**Deduction of molecular form from the crystalline liquid condition.** D. VORLÄNDER. *Z. angew. Chem.* 35, 249-50 (1922); cf. *C. A.* 15, 1429.—A no. of relations between the mode of linkage of the atoms in the mol. and the cryst. liquid condition have been deduced. Thus *p*-substitution in  $C_6H_4$  tends to give rise to the cryst. liquid form. From a study of the cryst. liquid condition it is shown that, like C and N, bivalent O and S are not linked linearly in the mol., but that the linking of the valences is angular, e. g., O, not H-O-H.



H. JERMAIN CREIGHTON

**Sizes of atoms in diamond-type crystals.** R. N. PEASE. *J. Am. Chem. Soc.* 44, 1497-8 (1922).—Values are given for the at. radius of substances of (1) the  $Ne$  type (diamond), (2) the H type (Si, S, Cl), (3) the Kr type (Ge, Cu, Zn, Br), and (4) the Xe type (gray Sn, Ag, I).

H. JERMAIN CREIGHTON

**Crystallographic axes in stereochemical aspect.** F. RINNE. *Z. Krist.* 56, 408-16 (1921); cf. *C. A.* 15, 983.—The cryst. axes introduced by Weiss are not merely of pedagogical significance as often thought; they bear a definite relation to the structure of the compds. With anhydrite ( $CaSO_4$ ) as an illustration the following constants are calcd.: crystal (Kristall) unit-volume,  $V_K = 0.8939$  cc.; crystal unit weight (Gewicht)  $G_K = 2.6817$  g.; crystal axes in cm.:  $a_K = 0.8932$ ,  $b_K = 1$ ,  $c_K = 1.0008$ . In considering volume relations the terms gram-molecule (and gram-atom) are commonly used, but are incorrectly formed; "mologram" would be better; this is shortened to mole. The molweight (molgewicht)  $G_M = 136$  g. The molvolume  $V_M = 45.33$  cc. The molaxes  $a_M = 3.306$ ,  $b_M = 3.701$ ,  $c_M = 3.705$ . These are identical with the so-called topic axes. The Loschmidt number  $Z$  (often erroneously called the Avogadro number) is taken to be  $6.05 \times 10^{23}$  leptons (ats. or mols.) per mol. The lepton-domain (bereich) of anhydrite  $V_L = 74.93 \times 10^{-24}$  cc.; the lepton weight  $G_L = 224.79 \times 10^{-24}$  g.; the lepton axes  $a_L = 3.909$ ,  $b_L = 4.376$ , and  $c_L = 4.380$  all  $\times 10^{-8}$  cm. The crystallographic fundamental unit or cell contains  $n$  molecules, the value of  $n$  being detd. by X-ray measurement; in anhydrite it is 4. The values for a cell (Zelle) are therefore:  $V_Z = 299.72 \times 10^{-24}$  cc.;  $G_Z = 899.16 \times 10^{-24}$  g.;  $a_Z = 6.205$ ,  $b_Z = 6.947$ , and  $c_Z = 6.953$ , all  $\times 10^{-8}$  cm. The effect of temp. on these various quantities can be brought out by comparing the data for alkali halides at 20 and 500°; for these  $n$  also = 4. Similar data are also given for quartz and for calcite compared with aragonite. The changes produced by temp. are of the same order of magnitude as those produced by replacing one constituent by another (K for Na, Br for Cl, etc.). Tabulation of the data shows that the space occupied by a lepton varies from one assemblage to another. These views fit in with those of earlier workers on morphotropy; the subdivisions crystal-, mol-, cell-, and lepton-morphotropy can now be recognized. Topotropy and isomorphism are not essentially different from morphotropy; but phys. and chem. morphotropy may well be distinguished.

E. T. WHERRY

**Fixing of single crystals by mechanical treatment.** M. POLANYI. *Z. Elektrochem.* 28, 16-20 (1922).—A resumé of results published previously (cf. *C. A.* 16, 1063).

H. JERMAIN CREIGHTON

**Colloids and the colloidal state of matter.** C. F. NELSON. *J. Am. Assoc. Cereal Chem.* 7, 53-64(1922).—The history of colloids and a discussion of their part in medicine, industry, etc., are given. LILLIAN OFFUTT

**The behavior of saturated vapors.** R. PLANK. *Z. tech. Physik.* 3, 1-7, 69-78 (1922).—A review. E. J. C.

**The rate of ascent of liquids through granular media.** F. E. HACKITT. *Trans. Faraday Soc.* 17, 260-7(1922).—The ascent of liquids in sands, which takes place in 2 to 24 hrs., according to the viscosity of the liquid, satisfies the laws of capillary flow for the tube-like spaces between the grains. The ascent may continue for over a yr. and the final heights attained may be 2 or 3 times the height reached in the first stage. This second stage satisfies an equation similar to that for capillary flow, but the constants deduced are not in agreement with the theory of capillary flow. W. H.

**Influence of temperature on the velocity of interpenetration of solids.** H. WEISS AND P. HENRY. *Compt. rend.* 174, 292-4(1922); cf. *C. A.* 16, 12, 550.—By properly cooling a 14% alloy of Sb in Ag, a solid is obtained which on etching with  $\text{FeCl}_3$  shows micrographically red-violet dendrites of  $\text{Ag}_3\text{Sb}$  on a field of a solid soln. rich in Ag. On annealing, the dendrites disappear and the field becomes homogeneous. The time required for the  $\text{Ag}_3\text{Sb}$  just to disappear was noted at different temps. The results of the better expts. are expressed by the equation  $v = 1/\theta = ka^T$ , in which  $v$  is the velocity,  $\theta$  the time in hrs. required for complete disappearance of the  $\text{Ag}_3\text{Sb}$ ,  $k = 4.17 \times 10^{-12}$  and  $a = 1.0324$ . If there exists a temp. at which  $v = 0$ , it must be not higher than  $280^\circ$ . If  $v$  is 0 only at  $0^\circ \text{K.}$ , the time required for complete homogenization is 1500 years at  $20^\circ$ . D. MACRAE

**Reduction of nitro compounds by stannous chloride.** H. GOLDSCHMIDT, E. STORM AND O. HASSEL. *Z. physik. Chem.* 100, 197-207(1922); cf. *Z. physik. Chem.* 48, 435 (1904); 50, 1(1906).—In the reduction of nitro compds. by  $\text{SnCl}_2$  and  $\text{HCl}$  a part of the acid can be replaced by metal chlorides (e. g., chlorides of Na, K, Li,  $\text{NH}_4$ , Ba and Cd) without changing the velocity of reduction. In reduction with  $\text{SnBr}_2$  and  $\text{HBr}$ , the acid can likewise be replaced by metal bromides.  $\text{CdBr}_2$  retards the reaction owing to the formation of complex salts. Addn. of strong acids, such as  $\text{H}_2\text{SO}_4$  and  $\text{C}_6\text{H}_5\text{SO}_3\text{H}$ , exerts but a slight influence on the velocity of reduction. The reduction with  $\text{SnCl}_2$  in the presence of  $\text{H}_2\text{SO}_4$  alone proceeds very slowly. H. JERMAIN CREIGHTON

**Surface tension of mixtures of alcohol and water at  $25^\circ$ .** L. L. BIRCUMSHAW. *J. Chem. Soc.* 121, 887-91(1922).—The surface tension of mixts. of  $\text{H}_2\text{O}$  and alc., varying from 0 to 100% alc., has been measured at  $25^\circ$ . The sharp point of inflection at 4.47%  $\text{H}_2\text{O}$  recorded by Firth has not been observed. H. JERMAIN CREIGHTON

**Properties of mixtures of ether, sulfuric acid and water.** J. R. POUND. *J. Chem. Soc.* 121, 941-5(1922).—Measurements have been made at  $30^\circ$  of the viscosity, d., cond., and contraction of mixts. of  $\text{Et}_2\text{O}$ ,  $\text{H}_2\text{SO}_4$  and  $\text{H}_2\text{O}$  of varying compn. H. J. C.

**A study of the system ammonia and water as a basis for a theory of the solution of gases in liquids.** B. S. NRUHAUSEN AND W. A. PATRICK. *J. Phys. Chem.* 25, 693-720(1922).—A static method has been developed for measuring the partial pressures of a component which is relatively very small compared to the partial pressure of the second component. This method has been used to det. the partial pressures of water and  $\text{NH}_3$  of concd.  $\text{NH}_4\text{OH}$  solns. at  $0^\circ$ ,  $20^\circ$ , and  $40^\circ$  at partial pressures of ammonia varying from 1000 to 4000 mm. The partial pressures of the  $\text{NH}_3$  were measured to within 4 to 2 mm.; those of the water to 0.08 mm. The soly. of  $\text{NH}_3$  in water was detd. at  $0^\circ$ ,  $20^\circ$ , and  $40^\circ$  at pressures from 750 to 3600 mm. The densities of these solns. were also detd. A theory of the nature of solns. of gases in liquids first advanced by Graham has been amplified, and the solns. of various gases in liquids have been classified on the basis of some of the physical and chemical properties of the gas. The formula  $V =$

$K(P\sigma/P_0)^{1/n}$  has been found to represent well the soly. of  $\text{NH}_3$ ,  $\text{HCl}$ ,  $\text{SO}_2$ , and  $\text{CO}_2$  in water at varied temp. and pressures. In this formula  $V$  is the vol. occupied by the liquefied gas dissolved per g. of water;  $P_0$  is the vapor tension and  $\sigma$  the surface tension of the liquefied gas at the temp., while  $P$  is the equil. gas pressure. The const.  $K$  has the value 0.49 for ammonia and  $1/n$  has the value 0.69. Soly. data for  $\text{HCl}$ ,  $\text{SO}_2$ , and  $\text{CO}_2$  have also been plotted according to this formula.

R. F. PRAXINIS

**Molecular and ionic hydrates.** ROBERT FRICKE. *Z. Elektrochem.* 28, 161-81 (1922).—Previous work on the compn. of mol. and ionic hydrates is briefly reviewed and discussed. The papers of Werner, Fajans and others on the mode of hydration are considered in detail.

H. JERMAIN CREIGHTON

**Ion activities in homogeneous catalysis. The formation of *p*-chloroacetanilide from acetylchloroaminobenzene.** H. S. HARNED AND HARRY SELTZ. *J. Am. Chem. Soc.* 44, 1475-84 (1922).—In reactions in liquid systems catalyzed by sp. ions, it is the activities of such ions which det. the velocity of the reaction at any temp. when catalysis depends on successive states of equil. The velocity consts. of the above reaction, catalyzed by  $\text{HCl}$ , have been detd. at several temps. for acid concns. from 0.1 to 1.0  $M$ . At each temp. these consts. are proportional to the product of the activities of the  $\text{H}$  and  $\text{Cl}$  ions of the catalyzing acid. The relation  $K_T = k/a_{\text{H}} \cdot a_{\text{Cl}}$ , which holds exactly for solns. of  $\text{HCl}$  alone, fails to hold when acid-salt mixts. are used as catalysts.

H. JERMAIN CREIGHTON

**First report of the committee on contact catalysis.** W. D. BANCROFT. *J. Ind. Eng. Chem.* 14, 326-31, 444-7, 545-8, 642-6 (1922).—Catalysis is discussed under the following heads: definite intermediate compds., indefinite intermediate compds., activation, promoters, oriented adsorption, poisons, protecting colloid as poison, early views on poisoning, corrosion, beneficial poisoning, possible suboxide of alumina, structure (of catalyst), intermediate stages (of the reaction), oxidation catalysts, adsorption by metals and metallic oxides, overvoltage and catalytic activity of metals, displacement of equil. The two fundamental things to be done next in the study of contact catalysis are: (1) To det. in what cases definite intermediate compds. are formed and what they are; (2) to det. what bonds and contravalences are opened when adsorption takes place, and to show that the opening of these bonds and contravalences accounts for the formation of the reaction products.

F. L. BROWNE

**The oxidation of oxalic acid in the absence of other acids.** J. C. WITT. *J. Phys. Chem.* 26, 435-446 (1922).— $\text{H}_2\text{C}_2\text{O}_4$  may be titrated with  $\text{KMnO}_4$  without the addn. of any other acid. The  $\text{H}_2\text{C}_2\text{O}_4$  serves as both reducing agent and as acid, and there are 2 distinct reactions although they proceed simultaneously. Of 8 equivs. of  $\text{H}_2\text{C}_2\text{O}_4$  present, (a) 5 are oxidized by permanganate, and (b) the other 3 equiv. combine with the products of (a). When this point has been reached the further addn. of  $\text{KMnO}_4$  solution produces a colloidal  $\text{Mn}$  compd., which is pptd. on boiling for a few seconds. The appearance of turbidity followed by a slight permanent ppt. marks the end-point. The end-point is affected by (a) the temp. at which the titration is made, (b) the concn. and (c) the presence of electrolytes in soln. When the soln. of an oxalate is titrated in the presence of  $\text{H}_2\text{SO}_4$ , the colloid precipitating power of the  $\text{SO}_4$  in a sense acts in opposition to the tendency of the  $\text{H}^+$  to keep the products of the reaction in soln. The former is sufficiently powerful to produce a ppt. in the presence of a fairly high concn. of the  $\text{H}^+$ . For this reason, the quantity of  $\text{H}_2\text{SO}_4$  actually required is much greater than the theoretical.

J. C. WITT

**Catalytic decomposition of certain oxides.** G. B. TAYLOR AND G. A. HULETT. *J. Am. Chem. Soc.* 44, 1443-5 (1922).—Kendall and Fuchs (*C. A.* 16, 521) have interpreted their results on the dissociation of  $\text{Ag}_2\text{O}$ ,  $\text{HgO}$  and  $\text{BaO}_2$  to mean that equil. is shifted by catalysts. Objection is made that this is not in accord with the phase rule

and also that some of the data are of doubtful validity. In the case of  $\text{HgO}$ , there is only one solid phase and therefore strictly speaking no fixed dissociation pressure of  $\text{O}$  at each temp., the pressure of  $\text{O}$  depending on the pressure of  $\text{Hg}$  vapor. J. M. B.

**Catalytic decomposition of certain oxides.** JAMES KENDALL AND F. J. FUCHS. *J. Am. Chem. Soc.* **44**, 1447-8(1922).—In answer to the criticisms of Taylor and Hulett (preceding abstract) it is admitted that the phase rule does bar  $\text{HgO}$  from consideration by this method. It is maintained that for  $\text{BaO}_2$  the equil. are essentially univariant and reversible in the presence of foreign oxides. Further exptl. evidence is promised.

JAMES M. BELL

**Sorption of iodine by carbon.** J. B. FIRTH. *Trans. Faraday Soc.* **16**, 434-52(1921).—The sorption of  $\text{I}$  by different forms of  $\text{C}$  from soln. in benzene and  $\text{CHCl}_3$ , resp., has been studied over periods of time extending to 5 years. The forms of  $\text{C}$  used were lamp-black, sugar-carbon, blood charcoal, animal charcoal, and coconut charcoal both from the fruit and the shell, definite wts. of which, after suitable heating, were shaken in a thermostat at  $25^\circ$  with a deci-normal soln. of  $\text{I}$  in the solvent. From the results obtained, the consts.  $\beta$  and  $P$  are calcd. in the formula  $x/m = \beta[(a-x)/v]^{1/P}$  where  $x$  is the amt. of  $\text{I}$  sorbed by  $m$  g. of  $\text{C}$ , and  $a$  is the total  $\text{I}$  originally present. Graphically, the results of the expts. are shown by plotting  $\log x/m$  against  $\log(a-x)$ . Generally, a rapid condensation of the  $\text{I}$  by the charcoal takes place in the first few mins., and is followed by a much slower sorption continuing for months or years. The first condensation is attributed to true adsorption, the second to a slow absorption. The amt. of sorption varies from about 90% of the total  $\text{I}$  present in the case of blood charcoal, with  $\text{CHCl}_3$  as solvent, to less than 3% with powdered coconut fruit charcoal. The difference is not to be attributed to difference in surface area, but to a sp. difference in the form and action of the  $\text{C}$  in the different cases. The amt. of sorption is always greater from  $\text{CHCl}_3$  than from benzene, in which  $\text{I}$  has a greater soly. During the second absorption phase the concn. of the  $\text{I}$  in the solvent diminishes to a certain minimum value, after which the rate of change of concn., whatever the mass of sorbing solid present, is so slow that the concn. appears const. The initial adsorption velocity is greater the smaller the size of  $\text{C}$  particles, while the presence of water in the  $\text{C}$  diminishes its activity.

J. C. S.

**Time reaction.** MARTIN MEYER. *J. Am. Chem. Soc.* **44**, 1498-1500(1922).—A time reaction between  $\text{H}_2\text{S}_2\text{O}_3$  and  $\text{Sb}$  salts is described, which is analogous to that with  $\text{Na}_3\text{AsO}_3$  and  $\text{H}_2\text{S}_2\text{O}_3$  described by Forbes, Estill and Walker (*C. A.* **16**, 1347). H. J. C.

**Heterogeneous equilibria: the ternary system sodium sulfate-sodium carbonate-water.** A. E. DAWKINS. *J. Chem. Soc.* **121**, 776-81(1922).—The isothermal equil. in the system  $\text{Na}_2\text{SO}_4\text{-Na}_2\text{CO}_3\text{-H}_2\text{O}$  have been investigated at  $19.1^\circ$  and  $50^\circ$ . The isothermal diagram at  $19.1^\circ$  consists of a double-branched liquid curve, an invariant point, and 2 solid curves representing solid solns. in equil. with the solns. represented by the 2 branches of the liquid. The isothermal diagram at  $50^\circ$  consists of a triple-branched liquid curve, 2 invariant points, and 3 solid curves representing solid solns. in equil. with the solns. represented by the 3 branches of the liquid curve. H. J. C.

**Thermodynamics of mixtures. IX.** M. B. WAGNER. *Z. physik. Chem.* **98**, 151-6(1921); cf. *C. A.* **15**, 2229.—The theory of the heat of mixts. is developed on the basis of the thermodynamics of mixts. treated in connection with the true components. J. C. S.

**Melting point, latent heat of fusion and solubility.** F. S. MORTIMER. *J. Am. Chem. Soc.* **44**, 1416-29(1922).—Methods are given for calcg. the soly. of non-ideal solns. and for finding the ideal slope of the  $\log N$  vs.  $1/T$  curves for any solute. For systems which do not form mol. complexes or solid solns., the ratio of the exptl. to the ideal slope of the  $\log N$  vs.  $1/T$  curves is a factor which can be detd. graphically.

When interpreted in the light of the principles discussed, the soly. or m. p. method of detg. latent heat of fusion gives very accurate results. H. JERMAIN CREIGHTON

Vapor pressures and heats of vaporization of non-associated liquids. F. S. MORRIS. *J. Am. Chem. Soc.* **44**, 1429-35(1922).—Empirical methods are given for evaluating the consts. in the vapor pressure and sublimation pressure equations,  $\log P_v = C_v - S_v/T$  and  $\log P_s = C_s - S_s/T$ . The value for the mol. heat of vaporization is  $4.23 \times S_v$ , rather than  $4.58 \times S_v$ . Thermodynamical equations relating heats of vaporization, of sublimation and of fusion and their relation to vapor pressure and sublimation pressure are discussed. H. JERMAIN CREIGHTON

Necessity of bringing concordance into the thermochemical data of organic compounds. W. SWIENTOSLAWSKI. *Roczniki Chemji* **1**, 59-103.—The author reviews a large number of thermochemical data of organic compds. and discusses the exptl. basis of the results. He maintains that a single organic substance ought to be chosen as the standard of thermochemical data; this substance should be benzoic acid, the heat of combustion of which should be determined with the greatest precision and the value obtained accepted as an international standard. The value ought to be expressed in calories and not in absolute units, since it is impossible to determine the latter quantity with the necessary precision. Calorimetric bombs should always be standardized by means of this substance, and authors of work in the thermochemistry of organic compounds should always state full details of the standardization of the bomb so that recalculation of the results may be possible. J. C. S.

Behavior of carbon at high temperatures. F. SAUERWALD. *Z. Elektrochem.* **28**, 183-5(1922).—The behavior of rods of C on heating by direct resistance up to temps. of the elec. arc has been studied. It has been found that an enriching of the impurities present takes place on the surface of the rod, due to the temp. difference between the inner and outer portions of the rod. This behavior affords an explanation of the formation of drops on the surface of the rod at high temps., the m. p. of the C being lowered on account of the concn. of impurities at the surface. Comments on the above. EUGEN RISHKEVICH. *Ibid.* 185-6.—The fact that drops of C are formed only on the cooler portions of the surface of the rod supports the conclusion that liquefaction of C occurs in consequence of a lowering of its m. p. through the presence of impurities. H. J. C.

Influence of telluric acid on the potential of a silver anode. FRANZ JURSA. *Z. Elektrochem.* **28**, 186-92(1922).—Halogens depolarize a Ag anode in an alk. medium, and displace the decompn. voltage towards a positive value. A compd.  $\text{Ag}_2\text{X}$  is formed by a primary reaction and  $\text{Ag}_2\text{O}$  by a secondary:  $2\text{AgX} + 2\text{ROH} \rightleftharpoons \text{Ag}_2\text{O} + 2\text{RX} + \text{H}_2\text{O}$ . The stages of depolarization were detd. by the potential of the electrode,  $\text{Ag} | \text{AgX}, \text{RX}(\text{soln.})$ . The max. depolarization is brought about with I, the min. with Cl. In alk. medium F does not depolarize, but accelerates the evolution of  $\text{O}$  at the anode. When a Ag anode is polarized to the max. extent in an alk. medium containing a halogen,  $\text{Ag}_2\text{O}$  is formed. In the presence of  $\text{K}_2\text{TeO}_4$  the following reactions take place: (a)  $\text{Ag}_2\text{O} + \text{K}_2\text{TeO}_4 + \text{H}_2\text{O} \rightleftharpoons \text{Ag}_2\text{TeO}_4 + 2\text{KOH}$ ; (b)  $2\text{Ag}_2\text{O}_2 + 2\text{K}_2\text{TeO}_4 + 2\text{H}_2\text{O} \rightleftharpoons 2\text{Ag}_2\text{TeO}_4 + 4\text{KOH} + \text{O}_2$ . When a Ag anode is polarized to a potential of 1.40 v. in an alk. medium of  $\text{H}_2\text{TeO}_4$ ,  $\text{Ag}_2\text{O}$  is formed. The potential of the electrode  $\text{Pt} | \text{Ag}_2\text{O}$  in an alk. medium of  $\text{H}_2\text{TeO}_4$  is const. Hence the reaction does not follow the scheme:  $\text{Ag}_2\text{O}_2 + \text{K}_2\text{TeO}_4 + \text{H}_2\text{O} \rightleftharpoons \text{Ag}_2\text{TeO}_4 + 2\text{KOH} + \text{O}_2$ . H. JERMAIN CREIGHTON

Instability of phthalate potentials. W. M. CLARK. *J. Am. Chem. Soc.* **44**, 1072-3(1922).—The claim of Oakes and Salisbury (*C. A.* **16**, 2064) that phthalate potentials are not stable is completely at variance with C's. experience. Wherever changes in potential have occurred, these have been due to electrode changes and not to changes in the phthalate solutions. JAMES M. BELL

**The theory of the pile.** DÈCOMBE. *Compt. rend.* 173, 834-6(1921).—D. proposes to base the theory of the hydroelectric pile on the proposition that the non-compensated heat developed in a pile in action by the chem. reaction proceeding in it is equal to the Joule heat,  $r^2 i^2 dt$ , which is developed therein by virtue of its internal resistance  $r$  and the current  $i$  which is circulating. This is discussed from a theoretical point of view.

J. C. S.

**The dielectric anomalies of silica glass.** A. JAQUEROD AND H. MÜGELI. *Arch. sci. phys. nat.* 4, 89-119(1922); cf. *C. A.* 16, 2063.—This is a study of the anomalous charging and discharging currents which occur in silica glass when it is used as the dielectric of a condenser. The relation between the anomalous current and the time after charge or discharge is,  $y(t) = (Ae^{-at}) + (Be^{-\beta t}) + (Ce^{-\gamma t})$ , rather than the usual  $y(t) = Bi^{-n}$ . In this equation  $\alpha$  increases with the temp., but  $\beta$  and  $\gamma$  are nearly const. The quantity of electricity transported by the residual current is  $Q_0 = \int_0^\infty y(t)dt = (A/\alpha) + (B/\beta) + (C/\gamma)$ . The normal conduction current was not observed in silica glass until a temp. of 60° was reached, and its relation to the temp.,  $\theta$ , is,  $i = Ke^{\theta/10}$ . The *sp. cond. of silica glass* as calcd. with the aid of this formula is, at 60°,  $3.1 \times 10^{-20}$  mhos/cc.; at 80°,  $3.16 \times 10^{-19}$ ; and at 100°,  $3.2 \times 10^{-19}$ . The curves representing the anomalous currents of charge and discharge are not superposable, but the total quantity of electricity transported by the anomalous discharge current is equal to that transported by the anomalous charging current. The anomalous current decreases with increasing temp. Between 20° and 65° the total quantity of electricity transported by it is represented as a function of the temp. by,  $(\theta = 0.0765\theta)$ . Heating silica glass causes also a permanent change in the value of the anomalous current. This permanent change depends on both the temp. and the duration of the heating. For unknown causes, the anomalous current in silica glass may vary capriciously from day to day, doubling or even trebling. Temp. variations or radioactive effects do not explain these variations. Gases ( $H_2$ , He), when dissolved in silica glass, play a complex, but as yet ill defined, part in the phenomena of these residual currents.

R. H. LOMBARD

**Dielectric strength of solid insulating materials.** W. S. FLIGHT. *Elec. Rev.* (London) 90, 39-41, 76-79(1922); *Science Abstracts* 25B, 157-8.—The author deals with the factors affecting the elec. strength of solid materials such as varnished cloth, micarta, mica paper, and flexible micanite. The following are touched upon: The test equipment; initial temp. of the insulation; thickness of insulation; shape of the insulating material; duration of application of voltage; thermal capacity of the electrodes; size and shape of electrodes; moisture content; tests carried out in air or in oil. Curves are given showing how the elec. strength varies with the no. of layers and also with the thickness of a fibrous material. The distribution across 3 layers of varnished cloth is plotted in the form of curves. The effect of time of application is illustrated by test curves on a micarta cylinder, oil-treated fuller-board, and varnished cloth. Test curves are also given showing the behavior of mica cambric under dry and humidified conditions. The author recommends that the temp. of the test sample and the electrodes should be approx. 90°. With reference to the length of time of application of the pressure, all figures should be based on the max. voltage that the material will withstand for one minute. This is detd. by first running up at the rate of 1 kilovolt per second and then attempting to apply 75% of the max. voltage for one minute. From the result of this second test the max. voltage the material will withstand for one minute can be ascertained. The area of the electrode should be 4 sq. in. Before testing, the test samples should be artificially dried and suspended for 24 hours in a humidifier at 25°.

E. H.



HEIBERG, J. L. *Naturwissenschaften, Mathematik und Medizin im klassischen Altertum*. 2nd ed. Bd. 370 der Sammlung "Aus Natur und Geisteswelt." Berlin: B. G. Teubner. 101 pp. M 5.60. Reviewed in *Fortschritte Chem.* 17, 64(1921).

KUENEN, J. P. *Die Eigenschaften der Gase (Kinetische Theorie-Zustandsgleichung)*. Bd. 3 des Handbuchs der allgemeinen Chemie. Edited by Wilh. Ostwald und Carl Drucker. Leipzig: Akademische Verlagsanstalt m. b. H. 448 pp. Reviewed in *Fortschritte Chem.* 16, 127(1920).

### 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

Recent advances in science—Physics. JAMES RICE. *Science Progress* 16, 533-6 (1922).—Review of recent work on atomic structure. JOSEPH S. HEFURN

Magnetic properties and atomic structure. B. CARRERA. *Anales soc. españ. fis. quim.* 20, 92-7(1922).—A general discussion. L. E. GILSON

The hydrogen molecule model. A. EUCKEN. *Naturwissenschaften* 10, 533-5 (1922).—An explanation of the limitations of the Bohr-Debye model. C. C. D.

Remeasurement of the radiation constant  $h$  by means of X-rays. WM. DUANE, H. H. PALMER AND CHI-SUN YEH. *J. Optical Assoc. Am.* 5, 376-87(1921).—See C. A. 16, 2072. E. J. C.

The mechanism of photoelectric conductivity. B. GUDDEN AND R. POHL. *Z. Physik* 7, 65-72(1921).—See C. A. 16, 1535. E. P. W.

The time of rise of photoelectric conductivity. B. GUDDEN AND R. POHL. *Z. Physik* 6, 248-56(1921).—See C. A. 16, 1535. E. P. W.

The electromagnetic field of the stationary trajectories of Bohr. EDMOND BAUER. *Compt. rend.* 174, 1335-8(1922).—A note in which the author tries to force the Maxwellian equations on the Bohr theory and in which it is manifest that he is not familiar with recent developments in this field. E. P. WIGHTMAN

Chemical action of the penetrating radium rays. XIII. The velocity of formation and the equilibrium of hydrogen peroxide. ANTON KAILAN. *Monatsh.* 42, 387-98 (1922); *Sitzb. Akad. Wiss., Wien* 130, II, 317-28(1921); cf. C. A. 15, 1100; 16, 378. XIV. The action on oxalic acid, potassium tetroxalate and potassium chlorate. *Monatsh.* 43, 1-12(1912).—The action of the Ra rays upon  $(\text{CO}_2\text{H})_2$  with and without U salts has been studied and the amt. of the decompn. into  $\text{CO}_2$  and  $\text{HCO}_2\text{H}$  detd. The role of  $\text{H}_2\text{O}_2$  in the decompn. is discussed. The reaction upon  $(\text{CO}_2\text{K})_2$  is very slight, the difference in the titration probably being due to the formation of  $\text{H}_2\text{O}_2$ .  $\text{KClO}_3$  in aq. soln. is only very slightly decompd. by Ra rays into  $\text{KCl}$  and  $\text{O}$ . C. J. WEST

Report on the pressure of electromagnetic radiation. W. H. WESTPHAL. *Jahrb. Radioakt. Elektronik* 18, 81-133(1921).—An excellent review of the theoretical and explt. work which has been done on the pressure of light. FARRINGTON DANIELS

Pressure in the corona discharge. JAKOB KUNZ. *Phys. Rev.* 19, 165-72(1922).—The phenomenon of the increase of gas pressure in the corona on passage of the current is further explained. Kunz and his students have shown that five phenomena are involved: (1) A small pressure difference exists between the center wire and the outer cylinder. (2) The pressure increase is proportional to the current in the d. c. corona, and appears within 1.5 secs. (3) With alternating current there is a pressure fluctuation with a period twice that of the a. c. frequency. (4) A pressure decrease results when the wire is heated. (5) A pressure increase results from heating, in accordance with Joule's law. Of these, (2) is the most important. Assuming that the momentum given the ions is transferred to the gas, K. shows that the excess pressure is given by  $i/4\pi\mu$ , where  $i$  is the current per unit length of wire and  $\mu$  is the mobility. Calcs. of

$\mu$  for  $H_2$ ,  $N_2$  and  $CO_2$  check with the mobilities as measured by Hess in the wind of ions arising from bombardment with  $\alpha$  particles. The mobility of  $O_2$  is only about one-eighth that obtained by Hess. The discrepancy is probably due to the formation of ozone in the corona. Assuming two types of ions, it is shown that in oxygen 13% of the ions are heavy ions and 87% light ions. The time required for the pressure increase is calcd. and agrees with expt. The fluctuations in pressure with a. c. are explained.

FARRINGTON DANIELS

A new method for the determination of molecular diameters by the electromagnetic rotation with a discharge in gases. C. E. GUYE AND R. RUDY. *Compt. rend.* 174, 382-4(1922).—The formula  $V = EH/12\pi\sigma^2mM$  is developed, where  $V$  = electromagnetic rotation,  $E$  = charge,  $m$  = mass,  $H$  = magnetic field,  $M$  = number of mols. and  $\sigma$  = radius of mol. (or ion).  $O_2$ ,  $N_2$ ,  $CO_2$ ,  $H_2$ ,  $N_2O$ ,  $CH_4$  and  $CO$  at 1 cm. pressure were subjected to an elec. discharge and to a magnetic field. Special precautions to purify the gas were necessary. From the observed rotations the mol. diameters were calcd. The results agree closely with the diameters calcd. from viscosities. The magnitude of the rotation is inversely proportional to the product of the mass and the square of the diameter of the mol.

FARRINGTON DANIELS

Research on the fluorescence of cellulose and its derivatives. S. J. LEWIS. *J. Soc. Dyers Colourists* 37, 201-4(1921); cf. *C. A.* 14, 3318.—A preliminary report. It is shown "that specimens differ not only in their fluorescent power but also in their selection for light of various wave lengths," and that materials selected by an expert are by no means the same in their fluorescent properties. Different lots of the same paper may differ widely but the same specimen gives approx. uniform results at all times. One illus. and 1 curve.

CHAS. E. MULLIN

The quantitative determination of the fluorescent powers (the spectrofluorescometry) of cellulose, sugars and other substances. S. J. LEWIS. *J. Soc. Dyers Colourists* 38, 68-76, 99-108(1922); cf. preceding abstr.—A new method of spectrofluorescometry is described, which is accurate to about 1%. A number of substances including various papers, linens, unions, cellulose and its derivs., sugars, starches, etc., were studied between the wave lengths  $\lambda$  2100 and  $\lambda$  3300, by means of a Hilger quartz spectrograph with the back of its camera modified to accommodate the glass lens of an auxiliary ordinary camera directed towards the plate of the spectrograph. Quant. curves are shown for the various substances over this range. The form and dimensions of these fluorescent curves have been shown to possess definite relationship with the constitution of the substance. A distortion, observed in certain cases, of the curves for sugar and celluloses at a wave length of about  $\lambda$  2460 possibly indicates some special feature of mol. structure. In some cases where a mol. is composed of several groups of the same kind, there is a reinforcement of the fluorescent power proportional to the no. of groups. In other cases, similar except that the groups are not all of one kind, there is a reduction, or interference, such that the fluorescent power of the complex is less than the sum of those of the constituent groups.

CHAS. E. MULLIN

Spectroscopy in laboratory and industry. F. LÖWE. *Chem.-Zig.* 46, 465-7, 490-2, 514-8(1922).—Because spectroscopic methods have not been used by chemists, particularly those in the industries, to the extent which their simplicity and accuracy warrant, L. undertakes to describe briefly the instruments and methods employed in using both emission and absorption spectra for analysis.

C. C. KIRSS

The proof of the law of photochemical equivalence as applied to the photographic dry plate. J. EGGERT AND W. NODDACK. *Sitzb. preuss. Akad. Wiss.* 1921, 631-5.—Application of the Einstein photochem. law was sought in the decompn. of  $AgBr$  by light of 407.8  $\mu\mu$  from a Hg-vapor lamp. A color filter was used. The intensity of the light was measured with a thermopile.  $Q$  = the no. of quanta calcd. from these meas-

urements.  $N$  = the no. of atoms of Ag produced, without development, detd. analytically by the Volhard method.  $Q/N$  = fraction of light used photochemically by the plate. This fraction is independent of the light intensity and time of exposure. Different types of plates gave different values of  $Q/N$  ranging from 1.5 to 10.8%. Light absorption as measured photometrically checked closely with these values, thus supporting the Einstein law. After development, the number of grains as counted in a photomicrograph was found to be about  $1/300$  the number of quanta absorbed. Large numbers of AgBr grains which were present between the Ag grains before fixing were unattacked. Probably a grain must have a reduced Ag atom at the surface before it can be attacked by the developer. This suggestion is supported by the fact that the ratio of mols. at the surface to mols. in the interior is just about 1 to 300. It is concluded that a Ag grain does not result from every quantum absorbed, but with weak illumination every Ag grain corresponds to one and only one absorbed quantum. F. DANIELS

**Photochemistry of silver compounds.** FRITZ WEIGERT. *Sitzb. preuss. Akad. Wiss.* 1921, 641-50.—A special AgCl emulsion on glass was exposed to light from a Uvial (Hg) lamp through Co glass. The plates were not developed. The sol. Ag salts were washed out and titrated. The Ag formed by the light was detd. with a nephelometer with an accuracy of 0.001 mg. per sq. cm. of area. The sum of the two was equal to the total sol. Ag before exposure, thus proving that light decomposes the excess sol. Ag salts rather than the AgCl. Expts. showed that the Ag liberated accelerates the photochemical decompn. The deposited Ag sensitized the plate to longer wave lengths. Exposure of several hours to red light increased the Ag deposit of a plate previously exposed, but did not increase it if the sol. Ag salts had been washed out. To test the Einstein law of photochemical equivalence a quartz Hg lamp was used with filters giving light of 436  $\mu$ . The energy was detd. with a bolometer calibrated against a Hefner candle. The fraction of light absorbed was detd. after varying exposures. The ratio of exptly. detd. photochemical equivalence to theoretical was less than 0.05. However, only the light absorbed by the Ag is effective. With only the light absorbed by the Ag, the above ratio becomes 0.65 for a 30-min. exposure and less for longer exposures. Plotting this ratio of observed to theoretical photochemical equivalence against the time of exposure gives a smooth curve which on extrapolation to zero time gives exactly unity. This shows that one Ag atom is liberated by one quantum and constitutes a proof of Einstein's law. An excess of the decompn. product acts as a screen and every quantum absorbed does not liberate an atom. This is characteristic of many photochemical reactions. It is suggested that the light liberates photo electrons from the Ag and that these are absorbed by the surrounding Ag salts with liberation of Ag.

FARRINGTON DANIELS

**The Einstein law of photo chemical equivalence.** FRITZ WEIGERT. *Physik. Z.* 22, 674-6(1921).—By extrapolation to zero time exposure the ratio of Ag atoms formed to light quanta absorbed by Ag is one, thus verifying the Einstein equivalence law. (Cf. preceding abstract.) Ag, on absorption of light, emits electrons which are absorbed by the neighboring mols. thus giving decompn. Weigert finds 73 to 84% absorption of violet light by the emulsion whereas Eggert and Noddack (see second preceding abstract) found 4 to 11. A discussion between the two workers is given. F. D.

**The radiation hypothesis of chemical reactivity and some of its applications.** W. C. McC. LEWIS. *Trans. Faraday Soc.* 17, 573-87(1922).—L. classifies catalysis as stoichiometric catalysis (ion catalysis) in which the increased velocity is due to the increased concn. of an intermediate compd. which is responsible for the reaction, and non-stoichiometric catalysis (solvent catalysis) in which the change in velocity is due to alterations in the critical increment, or the energy required for activation. The latter has a large temp. coeff. The former is practically independent of temp. A

detailed discussion of the reaction  $O_3 \longrightarrow O_2$  is given, in which attempts are made to connect the critical increment and the heat of reaction with the absorption bands for different types of decompn. A definite support for the radiation hypothesis has been found in the case of the decompn. of triethylsulfine bromide in nitrobenzene. From the temp. coeff. of the reaction velocity the critical increment is calcd. to be 28,530 cal., corresponding to an activating wave length of  $1.0\mu$  at  $1.05\mu$ . Lewis extends the conception of critical increment to apply to thermodynamic "activity," and to the mass law. If the total concn. of mols. is  $c$ , that of the active mols. ("activity") is  $ce^{-E/RT}$  where  $E$  is the critical increment.  $E$  changes with the environment. This is shown by the increase in activity of H ions on addition of KCl and sucrose. The 3 criticisms of the radiation hypothesis are discussed. The available energy is not limited to a single frequency but by conversion of one frequency into another within a "hohlraum" energy, equiv. to that of the whole spectrum, may be utilized by a chem. reaction. The failure of certain reactions to respond to the calcd. photo chemical excitation may be due to screening by the solvent. The fact that absorption bands are not found in the region predicted by the radiation hypothesis may be explained on the assumption that in some cases, not 1 but 2, 3, 4, or 5 quanta may be required to activate a mol. In the discussion, Langmuir reiterates his point that radiation, chem. action and other phenomena are all related but that one is not the cause of the other. Physical and chem. properties are discontinuous (mol. or at.) and should be classed as quantum phenomena. In reply, Lewis considers that the existence of photochemistry is good evidence for the radiation hypothesis and the assumption that radiation is the cause of chem. action.

FARRINGTON DANIELS

The photochemical decomposition of silver bromide. ROBERT SCHWARZ AND HEINRICH STOCK. *Ber.* 54B, 2111-2122(1922).—AgBr was exposed to sunlight for about 4 hrs., and the extent of the decompn. detd. by titrating the Br liberated with KI. The amt. of Br evolved depends on the condition of the AgBr (flocculent, plastic, or pulverized) and on its age (15 to 90 hrs.). If the AgBr is pptd. in a soln. contg. an excess of  $AgNO_3$ , no Br is liberated. This is due to a secondary chem. reaction and reformation of AgBr. The results of some investigators, who reported blackening of the Ag halide but no loss in wt. after long exposures, can be explained on this basis. Pre-exposure increases greatly the photochem. liberation of Br.

F. DANIELS

Spectrographic study of the return of color of barium cyanoplatinite according to the Villard effect. A. ZIMMERN AND E. SALLES. *Compt. rend.* 174, 80(1922).—BaPt-(CN)<sub>4</sub> was turned brown by exposure to X-rays and exposed to an arc light for a long time. The natural color gradually returned. Spectrographic examn. showed 4 principal bands: in the infra-red extending to the visible red, in the yellow-green, in the blue and in the ultra-violet. The ultra-violet band was very slow to come.

F. D.

Excitation of gas spectra by chemical reactions. F. HABER AND W. ZISCH. *Z. Physik* 9, 302-26(1922).—A Bunsen flame has 3 chem. distinct parts. The inner cone is a very thin greenish blue zone where the O of the air supplied to the burner is consumed and the combustible particles of the illuminating gas are oxidized in a mixt. of CO, CO<sub>2</sub>, H<sub>2</sub> and H<sub>2</sub>O. These gases are changed by outside air to CO<sub>2</sub> and H<sub>2</sub>O in a thin reaction zone surrounding the flame and called the outer cone. The space between the 2 cones (so-called water-gas space) is practically free of chem. processes. In such a flame the inner cone is the coolest part (1500 to 1600°) and the outer cone the hottest (1800°). The inner cone, although the coolest region, shows most luminosity and highest elec. cond. These properties might be of chem. origin rather than thermal. To test this possibility, flames are studied in which the temp. is kept below the limit at which any black-body radiation would be visible. The burning of Na vapor in Cl, Br, I vapor or O was investigated at ordinary pressure and the temp. was reduced

by diln. with N. A small cone-shaped flame was produced where the N laden with Na entered the space filled with halogens or O. With Cl the reaction luminosity became faintly visible at 340° while at 473° the D lines of Na were easily seen and photographed. It is concluded, however, that only a minute fraction of the Na atoms present is chem. uncombined and able to radiate in consequence of collisions, most of the available energy being scattered by mol. collisions leading to a rise in temp. of the reacting mass. The energy difference between a mol. of NaCl vapor and Na vapor and Cl gas is 77 cal. This exceeds the 49 cal. per mol. required by the D-line radiation. With Hg excitation of resonance radiation (2538 Å.) as for Na is not to be expected because the quantum energy is 111 cal. per mol. while the heat of burning an at. wt. of Hg with a mol. wt. of Cl<sub>2</sub> to form a mol. wt. of HgCl<sub>2</sub> vapor is only 53 cal., which corresponds to a wave length 5460 Å. The expt. performed with quartz app. indicated no trace of 2538 Å. resonance radiation even with a 10-hr. exposure, but gave a band spectrum extending from 5950 to 3000 Å. with ill defined maxima near 5900, 5600, 5500, 5400, 5300, 5250, 5020 and 4610 Å. This band spectrum was observed at flame temps. not over 525°. In an appendix to the paper the app. and method for measuring the pressure of Na vapor are described. The measured values at temps. 473, 500, 540, and 565° are 2.01, 3.59, 7.90 and 12.41 mm. Hg resp. W. F. MCGOWAN

Spark lines in the Röntgen spectrum. GREGOR WENTZEL. *Ann. Physik* 66, 437-62(1921).—Continuing previous work (C. A. 16, 1179, 2258), W. investigates the possibilities of a manifold ionization of the inner layers of an atom. The strong lines of the X-ray spectrum are called arc lines, and lines due to the change from one state of manifold ionization to another are called spark lines. These spark lines can exist only as fine structure of the well known X-ray lines and band heads. It is shown that all lines that formerly could not be placed in the X-ray system may be represented by spark lines. In particular, this theory explains the hard K $\alpha$  satellites and the complex structure of the K absorption bands. The characteristic frequency differences are satisfactorily explained in connection with supposed at. structure. K. BURNS

The thermionic triode as a rectifier. (MOULLIN, TURNER) 4.

#### 4—ELECTROCHEMISTRY

COLIN G. FINE

Present status of the French electrochemical industries. G. CORDIER, *et al.* *J. four élec.* 31, 73-4(1922). C. G. F.

Recent advances in applied electrochemistry. M. DEK. THOMPSON. *J. Franklin Inst.* 193, 775-94(1922).—Review of recent work on the application of the elec. current to the com. winning and refining of metals and manuf. of chem. compds. J. S. H.

Electric furnace melting. C. A. BIRD. *Chem. Met. Eng.* 26, 870-a(1922).—Advance in elec. furnace applications might be hastened by attention to progress in refractories, elimination of inherently poor designs, and by seeing that competent operators are in charge of all furnaces supplied. LOUIS JORDAN

Cast iron as produced in the electric furnace, and some of its problems. G. K. ELLIOTT. *Chem. Met. Eng.* 27, 116-9(1922).—See C. A. 16, 2269. E. H.

Storage batteries undergo a severe endurance test. L. C. ILSLEY AND H. B. BRUNOT. *Elec. World* 80, 177-8(1922); *Bur. Mines, Repts. Investigations* 1922, No. 2358, 4 pp.—Four makes of lead and of Ni-Fe storage batteries were subjected to 100,000 jolts while being charged and discharged. The depreciation was found to be negligible. Neither the record of the recording voltmeter nor current measurements made during charge and discharge gave any indication that any of the cells had been damaged by the

jolting. The jolt was brought about by dropping the cells vertically through a distance of 3 inches on to a board at the rate of 40 to 60 times per minute. The tests indicate that the battery cells at present supplied for mine locomotives have sufficient mechanical endurance to withstand the ordinary jolts they are likely to receive in service.

C. G. F.

**The lead hydroxide accumulator.** W. R. COOPER. *Electrician* 88, 654-6 (1922).—C. analyzes the claims for this type of accumulator and shows that since the chem. action is a surface phenomenon, great porosity is necessary for efficient operation. Excessive porosity, on the other hand, leads to weakness. The Pb hydroxide cell employs a  $H_2SO_4$  electrolyte stronger than the ordinary Pb-PbO<sub>2</sub> cell (sp. gr. 1.3-1.35 vs. 1.17-1.28). A greater output results but the variation in voltage over the discharge is necessarily greater. The internal resistance of the cell is increased by use of the stronger acid. The voltage drop becomes less as the acid becomes dil. and the discharge curve is flatter than otherwise. The Pb hydroxide cell is not revolutionary as regards results obtained.

W. H. BOYNTON

**Electrolytic reduction of glucose.** ALEXANDER FINLAY AND VERNON H. WILLIAMS. *Trans. Faraday Soc.* 17, 453-6 (1922).—The authors investigated the possibility of producing hexahydric alcohol. They used a closed cell as cathode chamber. The H used in reduction was found by difference in vol. evolved, compared with that evolved from a H voltameter placed in series with the electrolytic cell. Expts. were carried out at various temps., a current d. of 0.16 ampere per cm.<sup>2</sup> and solns. of 1, 3 and 10% glucose in 3%  $H_2SO_4$  being used. The total vol. absorbed in 72 min. was 1.42 cc. at normal temperature pressure. Tests were also made with a current concn. of 0.444 ampere per 100 cm.<sup>2</sup> and a cathode soln. of 20% glucose in 5%  $H_2SO_4$ . The total absorption amounted to 199.4 cc. or 40.1% of the theory. Pb electrodes were used in most expts. and graphite in others. This did not affect the results. The influence of temp. was inappreciable. Current concn. has greater influence than c. d. With low current concn. the absorption of H rapidly goes to 0, but by increasing the current concn. the absorption of H also increases, but falls off rapidly with time. No hexahydric alcohol was obtained. Considerable loss of glucose by diffusion from the cathode cell took place. Formic acid and a pentose were found in small quantities and the authors conclude it is the formic acid which leads to the formation of a film on the cathode, thus diminishing or preventing further reduction.

MARCUS J. FESSLER

**The anodic corrosion of bismuth with some notes on bismuth compounds.** E. B. R. PRIDEAUX AND H. W. HEWIS. *J. Soc. Chem. Ind.* 41, 167-71 (1922).—Anodes of Bi were used with the anolyte contained in a porous cup, and to prevent reduction of the nitrate to ammonia, the catholyte was also contained in a porous cup. The catholyte in each case was dil. alkali, the middle soln. was a 10%  $NaNO_3$  soln., and the anolyte was of a varying % of  $NaNO_3$ . Upon electrolysis  $BiONO_3$  is formed. A better and more complete pptn. occurred when the more concd. and slightly acid nitrate solns. were used as anolyte. The methods of prepn. of pure  $Bi(OH)_3$ , Bi oxycarbonate, and Bi salicylate are given. The prepn. of xeroform or bismuth tribromophenolate is given in detail. Thirty cc. of a soln. of  $Bi(NO_3)_3$  contg. 0.66 g. of metal is run into 20 cc. of alk. tribromophenol contg. 20 g. in 100 cc. of 0.5 N NaOH. After washing and drying, a yield of 3.5 g. of pink  $Bi(C_6H_3Br_3O)_2$  is obtained whose mol. wt. checks the theoretical value very closely.

E. F. PERKINS

**Photometric comparisons of gas-filled lamps.** W. E. FORSYTHE AND F. E. CADY. *Trans. Am. Illum. Eng. Soc.* 16, 591-8, 599-603 (1921); *Science Abstracts* 25B, 199 (1922).—The results of inter-laboratory photometric comparisons of 5 different types of gas-filled W lamps are given. The lamps used were three of each of 5 types as follows: Color temp.: 2745° K, 2835° K, 3010° K, 3185° K, 3290° K; efficiency:

1, 0.72, 0.62, 0.52, 0.46 w. p. c. (average); size: 100, 500, 1000 watt, 1000 watt (stereop-ticon), 900 watt (movie). D. MACRAE

**The thermionic triode as rectifier.** E. B. MOULLIN AND L. B. TURNER. *Elec-trician* 88, 442-4(1922).—The performances of the triode rectifier arrangements used in wireless telegraphy, with signals of various strengths and with or without a superposed local heterodyne oscillation, are investigated theoretically and exptly. The results are illustrated numerically by reference to a certain well known pattern of triode, and in the more fundamental cases the theoretical deductions are compared with precise exptl. measurements made at low frequency. The agreement is found to be very close. Complete paper in *J. Brit. Inst. Elec. Eng.* 60, 706-24(1922). D. MACRAE

**Five hundred tests on the dielectric strength of oils.** J. L. R. HAYDEN AND W. N. EDDY. *J. Am. Inst. Elec. Eng.* 41, 138-9(1922).—Five hundred successive break-downs were taken on a sphere-gap in oil at the same gap setting. Because of the well known inconsistency of breakdowns in oil these observations showed wide variation. A curve was plotted to show the relation between the breakdown voltage and the num-ber of breakdowns at each voltage. If the disruptive breakdown of oil is due to the voltage exceeding the dielec. strength of the oil, as is the case with air, it should be possi-ble to represent such a curve of probable error, or "probability curve" as it is usually called, by an exponential equation. In the present paper this is seen to be impossible, the most representative exponential curve being higher than the observations at higher voltages. The explanation is offered that this discrepancy is caused by foreign particles of low dielec. strength being drawn into the gap and therefore the dielec. strength of oil differs from that of air in that it does not represent the true breakdown value of the oil but is instead a measure of the presence of foreign particles in the oil.

D. MACRAE

**Purification of anthracite.** G. SCHUCHARDT. *Chem.-Ztg.* 45, 991(1921).—The use of anthracite in industry for the prepn. of C for electro chem. and electrotechnical purposes such as electrodes, elec. light carbons, C brushes for dynamos, etc., is depen-dent on its degree of purity. The mineral impurities, amounting to 2-5%, have been removed hitherto by chem. means, but only incompletely, e. g., by carbonization in a furnace followed by grinding. The difference between the sp. gr. of C of a particular size of granules and that of the mineral impurities permits sepn. to be effected by phys. means. Fractional sepn. is effected by washing with three solns. of  $\text{CaCl}_2$  of sp. gr. 1.32, 1.34 and 1.38; the first soln. gives a *fuel* with 0.2-1% of ash, the second one with 1-2%, and the third one with 2-3%. J. S. C. I.

**Storage battery.** E. F. ANDREAE. U. S. 1,420,675, June 27. Structural features.

**Storage battery.** E. HACKING. U. S. 1,421,217, June 27. The battery is made with an electrolyte of gelatinous consistency contg.  $\text{H}_2\text{SO}_4$ , Na silicate,  $\text{HgHSO}_4$ , and mineral oil. Cf. C. A. 16, 2272.

**Storage battery.** P. M. MARKO. U. S. 1,420,435, June 20. Structural features.

**Storage battery.** G. E. LUNDBERG. U. S. 1,421,017, June 27. Structural features.

**Storage battery construction.** W. GARDINER. Can. 220,485, July 4, 1922.

**Electrode for batteries.** R. WM. ERWIN. Can. 220,165, June 27, 1922. An electrode for primary batteries contains a pulverulent  $\text{CuO}$  soaked in mineral oil.

**Anodes.** A. H. WICKS. Can. 220,424, July 4, 1922.

**Electrolytic ethyl alcohol.** P. PASCAL. Swiss 88,188.  $\text{AcH}$  is submitted to direct reduction by electrolysis in acid soln. The electrolysis takes place in an app. with two chambers sepd. by a porous diaphragm. The cathode consists of  $\text{Hg}$  or  $\text{Pb}$ , with or without  $\text{Sb}$  coating. The anode consists of  $\text{Pt}$ ,  $\text{Pb}$ ,  $\text{Fe}_2\text{O}_3$ , graphite, or  $\text{C}$ .  $\text{AcH}$  is gradually added to the cathode chamber and the electrolysis conducted at a temp. not

exceeding  $40^\circ$  and a c. d. not exceeding 2–3 amp. per sq. m. The formation of croton-aldehyde is prevented by shortening the period of reduction. Formation of AcOH is prevented by the use of the diaphragm and the yield is almost theoretical. In the place of AcH, its polymerides may be used or AcH may be formed in the app. from  $C_4H_8$  by a catalytic process. The electrolysis may be conducted in the presence of  $H_2SO_4$ ,  $H_3PO_4$ , org. sulfonic acids, or  $NaHSO_4$ .

**Electrolytic reduction of aldehydes or ketones of the aliphatic terpene group.** KUSUKA KAINOSHÔ and RIKI HORIUCHI. Jap. 39,558, Aug. 18, 1921. Aldehydes or ketones of the aliphatic terpene group are reduced electrolytically to the corresponding alcohols. A mixt. of 1 part citronellal, 8 parts alc., and 2 parts 20% NaOAc soln. is used as a catholyte and 2 parts 20% NaOH as an anolyte. Hg and Pb are used as the resp. poles; c. d. is 5 amp. per sq. dm. The operation is conducted at  $60^\circ$ . Citronellol is produced in a good yield.

**Electrolytic apparatus adapted for producing tartrates from glyoxylates.** H. W. PAULUS. U. S. 1,420,212, June 20.

**Electrolytic apparatus adapted for making glyoxylic acid compounds from oxalic acid.** H. W. PAULUS. U. S. 1,420,211, June 20. Na amalgam is used in the conversion.

**Electric induction furnace.** S. N. CASTLE. U. S. 1,420,687, June 27. The furnace comprizes a crucible with sloping walls.

**Tilting electric furnace adapted for refining metals.** K. LEANDER. U. S. 1,420,561, June 20.

**Refractory conductors.** A. JUST. Can. 220,721, July 11, 1922. Cryst. W is pressed in molds, preferably with a carbonizable binder, to form bars which are sintered, made ductile by mechanical working and finally drawn to produce *filaments*. The binder is driven out in the operation of the process or W oxide may be added to remove the C by oxidation.

**Tungsten alloy for filaments.** J. A. YUNCK. U. S. 1,422,019, July 4. W is alloyed with 5% or less of Th for the manuf. of filaments of incandescent elec. lamps which can be swaged and drawn and do not discolor the bulbs.

**Incandescent body for incandescent lamps.** F. HANAMAN. Can. 220,720, July 11, 1922. A homogeneous solid cryst. soln. of W with a small percentage of such metals as Cr, V, Mo, Th, Ti, etc., is made by heat treatment and the solid mechanically worked and drawn to produce *filaments*.

## 5—PHOTOGRAPHY

LOUIS DERR

**A new intensification process.** Z. CERMAK and A. HOFBAUER. *Phot. Rundschau* 59, 159–60(1922).—The Ag image is bleached with  $K_3Fe(CN)_6$ , then treated with a salt of any metal whose ferricyanide is sol. but whose ferrocyanide is not. The salts of  $Fe^{+++}$ ,  $UO_3$ , Th, Mo, and Pb are indicated.

L. DERR

**Color-toned diapositives.** ANON. *Phot. Rundschau* 59, 162–3(1922).—The plate is given a preliminary immersion in  $CuSO_4$  7.5 g.,  $NH_4$  citrate 25 g.,  $K_3Fe(CN)_6$  8 g.,  $NH_4CO_3$  4 g., water 1 l. For red tones it is then immersed in safranin 1 g., glacial  $CH_3COOH$  5 cc., water 1 l.; for violet tones the bath is methyl violet 0.4 g., glacial  $CH_3COOH$  5 cc., water 1 l. Double tones are obtainable by allowing the preliminary bath to act only partially and then immersing the plate in 1%  $K_2CrO_7$  25 cc., Fe alum 1.25 g., oxalic acid 3 g.,  $K_3Fe(CN)_6$  1 g.,  $NH_4$  alum 5 g., HCl 0.1 cc., water 1 l. Orange nuances can be obtained by bathing the double-toned plate in chrysoidin 0.4 g., glacial  $CH_3COOH$  5 cc., water 1 l.

L. DERR



**Conductivity of the latent image.** A. G. RABINOVICH. *J. Phys. Chem.* 26, 577-80 (1922).—A decrease of the elec. resistance of the light-sensitive film of the photographic plate would indicate that the appearance of the latent image is a purely physical phenomenon—the increase in the number of free electrons by insolation. Abnormally high values of temp. coeff. of conductivity were found, 10%-20% per deg., but neither dry nor liquid emulsions changed their electrical resistance, within the limits of exptl. error, when exposed to light. Hence, with the precision now attainable, the riddle of the latent image remains unsolved by this method. L. DERR

**New gelatin reliefs and their uses.** G. KOPPMANN. *Phot. Rundschau* 59, 144-6 (1922).—When a AgBr gelatin film is developed in pyrocatechol without sulfite the gelatin is locally hardened in proportion to the exposure. This is the basis of a new process, in which the gelatin plate is exposed from the back and developed as above, the unhardened gelatin being then removed by warm water; or, the Pinatype dye process may be used, or processes involving the swelling of unhardened gelatin. L. DERR

**New process for the preparation of duplicate negatives.** LÜPPO-CRAMER. *Phot.* 1921, 118.—Renwick's iodide-thiosulfate-sulfite soln. (1%, 2%, and 2%, resp.; cf. C. A. 14, 3200) is recommended for use in the prepn. of duplicate negatives, pre-exposed plates being bathed in the soln., washed, dried, exposed behind a negative, and developed. The first exposure controls the density and gradation obtainable in the duplicate. J. S. C. I.

**Double tones with selenium.** W. FORSTMANN. *Phot. Rundschau* 59, 173 (1922).—These tones, often very pleasing, passing from black through red-violet to warm brown, may be obtained by reducing developing-paper prints, using any of the ready-prepd. Se toning baths without previous bleaching. After the Se bath immersion in a clearing bath of 10%  $\text{KHSO}_4$  is required, a 10-min. wash, a brief dip in a weak Farmer reducing bath, and a 30-min. wash. L. DERR

**Sensitometric experiments with wet collodion.** L. P. CLERC. *Bull. soc. franc. phot.* [3] 9, 188-91 (1922).—For equal blackening on a given plate, the exposure times are inversely proportional to the illumination, within the error of the expts. L. DERR

**Color-sensitiveness of silver iodide.** LÜPPO-CRAMER. *Phot. Ind.* 1921, 611-2.—A AgI plate exposed to daylight under an Eder-Hecht sensitometer scale with colored strips, and then developed with potash-amidol developer, shows the greater part of the sensitiveness to be in the blue; there is no image at all under the yellow strip, not even the fog which occurs on other unexposed parts of the plate. Slight positive images are obtained under the red and green strips. Treatment with rhodamine soln. before exposure produces strong color sensitizing, and the "reversing" action under the yellow strip disappears entirely; treatment with nitrite does not remove the reversing effect of yellow. Erythrosin, pinachrome, and pinacyanol also, to varying degrees, reduce the reversing effect of yellow light but differ somewhat amongst themselves and from rhodamine in their effects on the red and green sensitiveness. J. S. C. I.

**Increasing the photographic sensitiveness of silver salts by means of dyes.** LÜPPO-CRAMER. *Phot.* 1921, Nos. 6 and 8.—The increase of general sensitiveness (i. e., to white light) which is produced in a AgI-gelatin plate by treatment with certain dyes such as Rhodamine B and a "chem." sensitizer, such as  $\text{K}_4\text{Fe}(\text{CN})_6$ , is not obtained with ordinary, coarse-grained, AgBr-gelatin plates. With very fine-grained plates or "grainless" plates such as those used in the Lippmann process, however, the sensitiveness is increased up to about 16 times by all the "optical" sensitizers tested, including pinachrome, pinacyanol, erythrosin, etc. The sensitizing is obtained with or without a further treatment with  $\text{NaNO}_2$  and is greater than the effect of the latter alone; it is also much more marked with phys. development than with chem. development. There

is no effect on the speed of development. The most important desensitizers—phenosafranine, etc.—reduce the sensitiveness of the same plates about 10 times. The action of the sensitizing dyes is probably chem. rather than optical, particularly as the increase occurs in the original (blue) sensitiveness of the plate. The color-sensitizing obtained by treatment of diapositive plates with, *e. g.*, orthochrome, which is much more marked than that given by ordinary plates, is also accompanied by considerable increase of general sensitiveness. The general sensitiveness of AgCl-gelatin emulsions is also considerably increased by treatment with pinachrome, less by pinacyanol, and not at all by erythrosin. The increase of sensitiveness obtained with Lippmann plates still leaves them, however, excessively slow, so that this method of increasing the speed of a fine-grained plate without affecting grain size has as yet no practical application. The sensitizing action of pinaflavol (*Phot. Korr.* 58, 29–31 (1921)) is much more pronounced than that of the other dyes tested and is considerable with fine-grained chloride plates and with plates of medium size grain such as AgBr diapositive and photomechanical plates. The sensitizing with fine-grained plates is much stronger than that of nitrite, but the reduction of solarization is much less. Further, the tendency to veil which was found with fast plates treated with pinaflavol soln. even as weak as 1 : 300,000 (König and Eder) does not occur with the slower plates even with solns. 1 : 10,000. The gradation of the plate is appreciably softened by the pinaflavol treatment, and the plates have poor keeping quality.

J. S. C. I.

**Sensitization and durability.** E. STENGER. *Z. wiss. Phot.* 21, 246–53 (1922).—Plates which are washed in sensitizing solns. show a better sensitivity but less durability than those to which the sensitizer was added in the emulsion. The former class is however improved greatly in durability when  $\text{NH}_4\text{Br}$  is added to the soln. of the sensitizer.

G. R. FONDA

**Sensitivity to light of acidic tar dyestuffs with benzidine and their photochemical properties.** J. M. EDER. *Sitzb. Akad. Wiss. Wien.* 130, 11a, 329–31.—Comps. of the aromatic *p*-diamino bases, such as benzidine, with acid dyestuffs, such as eosin, allow photographic prints to be made in color on paper or glass (D.R.P. No. 337173—Dec. 21, 1919). Their sensitivity to white light is not as great as that of AgCl paper, but is greater for green to yellow light. The action depends upon a darkening of the dye as the result of photochem. oxidation of the benzidine.

G. R. FONDA

**2-*p*-Dimethylaminostyrylpyridine methiodide, a new photographic sensitizer.** WM. H. MILLS AND WM. J. POPE. *J. Chem. Soc.* 121, 946–7 (1922).—2-*p*-Dimethylaminostyrylpyridine methiodide is formed by boiling 2- $\text{MeC}_6\text{H}_4\text{NMeI}$ ,  $p\text{-MeNC}_6\text{H}_4\text{CHO}$  and alc. contg. a little  $\text{C}_6\text{H}_5\text{N}$  for 5 hrs.; it forms bright red prisms with a blue reflex, *m.* 275°. It dyes silk a bright orange-yellow which is not fast to light. The orange solns. show a band of selective absorption in the blue and green with obscurely marked max. at about  $\lambda$  4750 and  $\lambda$  4600. This substance is the most powerful sensitizer for green light yet known for AgBr gelatin photographic plates. Plates are uniformly sensitive to light of all wave lengths from the blue to about  $\lambda$  5600; the photosensitivity then falls off rapidly until it ends at about  $\lambda$  6200.

C. J. WEST

**Desensitizing with potassium iodide.** Freund's method. LÜPPO-CRAMER. *Phot. Ind.* 1921, 840.—A re-investigation, by sensitometric methods, of Freund's process for desensitizing photographic plates by treatment with KI, on the lines recommended by Bolas (*C. A.* 16, 206), resulted in a confirmation of the previous objections raised against the process. Exposure must be increased about ten times to compensate for the destructive effect of the iodide on the latent image; the resulting negative is flat, and fixation in "hypo" is very slow.

J. S. C. I.

**Dye precipitation in the safranine process.** LÜPPO-CRAMER. *Phot.* 1921, No. 6, 21.—In the prepn. of concd. developers of *p*-aminophenol, glycine, pyrogallol, catechol,

or metol. along with safranine, a ppt. of the dyestuff is formed which does not always dissolve immediately on diln. of the developer to the correct strength for use, especially if the soln. has been prepd. some time. If tested immediately after diln. the desensitizing power is very low. On standing for 5 min., or warming the soln., or, in the case of *p*-aminophenol, adding a little caustic alkali, the ppt. re-dissolves and the desensitizing action becomes normal. If quinol is present the ppt. does not re-dissolve in the same way, and it is therefore necessary in applying the safranine process to developers contg. quinol to add the dyestuff soln. (preferably 1 : 2000) to the prepd., dild. developer.

J. S. C. I.

**Photographic reproduction of watermarks.** O. MENTRÉ. *Z. wiss. Phot.* 21, 227-31 (1922).—Of several methods for reproducing watermarks clearly in the presence of writing, the best depends on the relatively greater diffusion of a gas through the watermark lines where the paper is thinner. A AgBr paper after general exposure and development is bleached in HgCl<sub>2</sub> and placed upon the watermarked paper in NH<sub>3</sub> gas. Figures of different stages show the clear outline resulting.

G. R. FONDA

The proof of the law of photochemical equivalence as applied to the photographic dry plate (EGGERT, NODDACK) 3. Isoquinoline and isoquinoline reds (HARRIS, POPP) 10.

**Motion picture films in colors.** K. WARGA. U. S. 1,420,673, June 27. A photo-mechanical process.

## 6—INORGANIC CHEMISTRY

H. I. SCHLESINGER

**Historical, critical and experimental study of the constitution of hydrogen peroxide and its derivatives.** A. R. MIRO. *Rev. acad. cien. Madrid.* 18, No. 1, 2, and 3, 30-63 (1919).

R. B. DREMER

**Compounds of cuprous oxide.** J. ERRERA. *Bull. acad. roy. Belg. Cl. des Sci.* [5], I, 361-8 (1921).—On electrolyzing alkali bicarbonate solns. free from Cl with a Cu anode, a film of Cu<sub>2</sub>O forms on the Cu and on top of this a layer of a green insol. basic carbonate, 2CuCO<sub>3</sub>·2Cu(OH)<sub>2</sub>·H<sub>2</sub>O, is gradually built up, while a certain amt. of Cu dissolves as Na<sub>2</sub>CO<sub>3</sub>·CuCO<sub>3</sub>·3H<sub>2</sub>O. No formation of azurite was observed. With high current densities a black deposit of Cu, changing to the ordinary form with acids, was obtained on the cathode. Electrolysis of an alkali silicate soln. with a Cu anode resulted in the formation of an insol. Cu silicate and a coherent deposit of Cu<sub>2</sub>O on the anode. The formation of cuprous ions in solns. contg. other anions than those of the halogen acids was studied. Thus Cu(NO<sub>3</sub>)<sub>2</sub> may be partially reduced by electrolysis in the presence of metallic Cu or by simply heating the soln. with the metal. In a 0.2 *N* Cu nitrate soln. at 97°, in the presence of Cu, the concn. of the cuprous ions is  $5 \times 10^{-4}$  g. per l. while the ratio Cu<sup>++</sup>/[Cu<sup>+</sup>] =  $5 \times 10^4$ . By hydrolysis of such a soln. Cu<sub>2</sub>O is formed, and it is probably by some similar reaction that this compd. is formed in the carbonate and silicate solns., expt. having shown that it is produced on heating an aq. suspension of the carbonate in a sealed air-free tube in the presence of Cu gauze. This is suggested as a possible explanation of the occurrence of cuprite with malachite and native Cu in ore deposits.

J. S. C. I.

**Rubidium (cesium) silver gold bromide.** EUGEN SUSCHNIG. *Monatsh.* 42, 390-404 (1922); cf. C. A. 14, 3605.—The reaction of AuBr<sub>3</sub> in acid soln. with Rb or Cs and Ag salts results in the formation of bromides corresponding to the previously described Cl deriv. The rubidium salt (Rb<sub>2</sub>Ag<sub>2</sub>Au<sub>2</sub>-(x/2)Br<sub>4</sub>) forms dark violet needles, 1 mm. long, and sometimes of considerable thickness. The cesium salt resembles the Cl

deriv. The Ag content varied from 0.89 to 1.14 atoms in the Cs compd. and from 0.77 to 1.59 in the Rb compd. Expts. to replace the heavy alkali metals by K failed. The Br compds. are not as suitable for microchem. detection of Au, Ag, Rb, and Cs as the Cl compds.

C. J. WAST

The action of several salt solutions on aluminium, copper, lead and zinc. C. H. CROWE. *Can. Chem. Met.* 6, 151-2(1922).—Strips of Al, Cu, Pb and Zn were boiled for 24 hrs. in normal solns. of K, Na, and Mg chlorides, sulfates and nitrates, and in distd.  $H_2O$ . Water attacked the metal in every case in the presence of air, in varying degrees. Al was not attacked appreciably by any of the solns. Cu is attacked somewhat by chlorides and sulfates, but not by nitrates. Pb was noticeably attacked in every case, especially by nitrates. Zn was appreciably attacked by sulfates and nitrates, but scarcely at all by chlorides. The expts. were repeated with the addition of  $NaH_2PO_4 + Na_2HPO_4$  soln. to one series, and  $AcONa + B(OH)_3$  to another. Results similar to the above were obtained, proving that H-ion concn. did not play a part in the reaction.

E. G. R. ARDACH

Oxidation of manganese to permanganate in alkaline solution. J. HESLINGA. *Chem. Weekblad* 19, 274(1922).—Manganous salts are oxidized by Br in alk. soln. if copper salts are added as catalyst. The catalytic action is due to the formation of dissociable peroxides and of complex Cu-Mn salts. For the same reason manganous salts are oxidized on Cu anodes. For detection of manganous salts it is best to heat the soln. first with a copper salt (more Cu than Mn) and to add then Br in alkaline soln. Cl instead of Br does not work satisfactorily.

R. BEUTNER

## 7—ANALYTICAL CHEMISTRY

WILLIAM T. HALL

Rapid electroanalysis. A. KLING AND A. LASSIEUR. *Ann. chim. anal. chim. appl.* 4, 171-7(1922).—A description of app. and methods of analysis with rotating electrodes. Special attention is paid to the detn. of Cu, Pb, Zn, Ni, Hg, Sb and Sn and to the analysis of brass, bronze and white metals.

W. T. H.

Conductivity titrations in precipitation analysis. III. Determinations with mercuric perchlorate. I. M. KOLTHOFF. *Z. anal. Chem.* 61, 332-43(1922).— $Hg^{++}$  is characterized by forming many salts which are practically non-ionized into the simplest constituents. In some cases an insol. compd. is formed and in others a sol. complex.  $Hg(NO_3)_2$  is largely ionized but is not very sol. in pure water.  $Hg(ClO_4)_2$  on the other hand has about the same elec. cond. in soln. as the  $HClO_4$  from which it is made. It appears to be the most suitable Hg salt for reactions of the type studied. It may be prepared from Kahlbaum's  $HClO_4$  with  $HgO$  which has been boiled with  $Na_2CO_3$  soln. and washed with water till free from chloride. If an ion in soln. forms a ppt. or a slightly ionized complex with  $Hg^{++}$  then on adding  $Hg(ClO_4)_2$  the elec. cond. will not increase materially until all of the dissolved ion has reacted after which further addition of electrolyte will show a marked increase in cond. By such a method of analysis, it is possible to titrate halides accurately even in extremely dil. solns. but the results are not usually satisfactory when an attempt is made to det. the content of different halides in the presence of one another.  $I^-$ , however, can be titrated approximately in the presence of  $Cl^-$ ,  $CN^-$  in the presence of  $CNS^-$ , and  $CN^-$  in the presence of  $Cl^-$ . Ferrocyanide can be titrated with an accuracy of 1%. Ferrocyanide, as with  $Ag^+$ , gives first a salt of the general formula  $KM_1Fe(CN)_6$  and the normal salt with an excess of the reagent. Acetates, formates, monochloroacetates, lactates, butyrates and valerates can be titrated directly. The  $Hg^{++}$  salt of  $CCl_3COOH$ , however, is strongly ionized

and cannot be titrated. Salts of polybasic aliphatic acids cannot be titrated accurately. Benzoates and salicylates may be titrated.

W. T. H.

**The electrometric determination of cyanogen in the presence of halogens.** ERICH MÜLLER AND HANS LAUTERBACH. *Z. anorg. allgem. Chem.* 121, 178-92(1922).—When  $\text{CN}^-$  is titrated electrometrically with  $\text{Ag}^+$  two end-points are obtained—the first corresponds to the addition of  $1/2 \text{ Ag}^+$  for each  $\text{CN}^-$  present and the second for the addition of an equal amt. more of  $\text{Ag}^+$  whereby  $\text{AgCN}$  is pptd. In ordinary titration of  $\text{CN}^-$  the first end-point would be chosen. The soly. product of  $\text{AgCN}$  lies between that of  $\text{AgCl}$  and  $\text{AgBr}$ . Owing to the fact that  $\text{AgCl}$  and  $\text{AgBr}$  form solid solns. with one another, Liebig found it possible to titrate  $\text{Cl}^-$  and  $\text{Br}^-$  electrometrically in mixts. of these halides only under the most favorable conditions. It is, therefore, remarkable to find that it is possible to titrate  $\text{CN}^-$  and halide mixts. and det. each constituent. With  $\text{I}^-$  and  $\text{CN}^-$ , 3 end-points are obtained, the first when  $1/2 \text{ Ag}$  has been added for each  $\text{CN}^-$ , the second when additional  $\text{Ag}^+$  has pptd. the  $\text{I}^-$ , and the third when all the  $\text{CN}^-$  is pptd. as well as all of the  $\text{I}^-$ . With  $\text{CN}^-$  in the presence of  $\text{Cl}^-$  or  $\text{Br}^-$ , only 2 end-points are obtained but these suffice. The first corresponds to the addition of  $1/2 \text{ Ag}^+$  for each  $\text{CN}^-$  present, the second for the pptn. of  $\text{AgCN}$  and  $\text{AgCl}$  or  $\text{AgBr}$ . With  $\text{I}^-$ ,  $\text{Br}^-$  and  $\text{CN}^-$ , 3 end-points are obtained. The first corresponds to  $1/2 \text{ CN}$ , the second to the pptn. of  $\text{AgI}$  and the third to the pptn. of  $\text{AgI}$ ,  $\text{AgCN}$  and  $\text{AgBr}$ , thus giving enough data for the entire analysis. With  $\text{Br}^-$ ,  $\text{Cl}^-$  and  $\text{CN}^-$ , only 2 end-points are obtained so that it is possible to compute only the  $\text{CN}^-$  and total halogen content. A simplified arrangement of the elec. app. is shown by which the analysis can be carried out very easily.

W. T. H.

**Uses of amalgams in volumetric analyses. IV. Uses of cadmium amalgam.** NAOTUNA KANO. *J. Chem. Soc. (Japan)* 43, 333-40(1922); cf. *C. A.* 16, 1716.—Instead of  $\text{Zn-Hg}$ ,  $\text{Cd-Hg}$  is used. The method of prepn. of the amalgam and analysis are exactly the same as that of  $\text{Zn-Hg}$ , except that the tube *E* (*C. A.* 16, 1543) is filled with dil.  $\text{H}_2\text{SO}_4$  instead of boiled  $\text{H}_2\text{O}$ . The results are fully as satisfactory in the detn. of  $\text{Mo}$  and  $\text{Fe}$ , less satisfactory in the detn. of  $\text{V}$  and  $\text{Ti}$  and the presence of  $\text{CO}_2$  is desirable in the detn. of  $\text{U}$ , although undesirable when  $\text{Zn-Hg}$  is used.

S. T.

**Method for the removal of phosphoric acid in qualitative analysis.** D. BALAREFF. *Z. anorg. allgem. Chem.* 121, 254-6(1922).—The method depends upon the pptn. of  $\text{Pb}_3(\text{PO}_4)_2$  in the presence of very dil. acid. To the soln. of the  $\text{NH}_4\text{OH}$  and  $(\text{NH}_4)_2\text{S}$  ppt. in dil.  $\text{HCl}$ , add  $\text{NH}_4\text{OH}$  till a slight permanent ppt. is obtained. Dissolve this ppt. in the smallest possible quantity of  $\text{HCl}$  and add a large excess of  $\text{Pb}(\text{NO}_3)_2$  soln. so that 5 or 10 equivs. of  $\text{Pb}^{++}$  are present for each  $\text{PO}_4^{---}$ . Add a few drops of methyl orange indicator soln. and  $\text{AcONa}$  soln. until the red color begins to disappear. After 5 mins. filter and test the filtrate with molybdate to see if the pptn. was complete, adding, if necessary, a little more  $\text{AcONa}$  to complete the pptn. Although  $\text{FePO}_4$ ,  $\text{AlPO}_4$  and  $\text{CrPO}_4$  are insol. in dil.  $\text{AcOH}$  enough of these elements remains in soln. to give good tests although sometimes most of the  $\text{Cr}$  is pptd.  $\text{Ti}$ ,  $\text{U}$  and  $\text{Zr}$ , however, are carried down with the  $\text{Pb}_3(\text{PO}_4)_2$  ppt. This method of removing  $\text{PO}_4^{---}$  is claimed to be more satisfactory than the  $\text{Sn}$  or basic acetate procedures.

W. T. H.

**Determination of manganese by permanganate and the examination of various manganites.** P. B. SARKER AND N. R. DHAR. *Z. anorg. allgem. Chem.* 121, 135-55 (1922).—In the Volhard method for detg.  $\text{Mn}$  by titration with  $\text{KMnO}_4$  in nearly neutral soln. it is customary to have  $\text{Zn}^{++}$  present to avoid the formation of  $\text{Mn}^{++}$  manganite. It is now found that almost any other cation works just as well as  $\text{Zn}^{++}$  and that accurate results can be obtained in the Volhard titration in the presence of  $\text{MgSO}_4$ ,  $\text{KNO}_3$ ,  $\text{K}_2\text{SO}_4$ ,  $\text{CdSO}_4$ ,  $\text{NaNO}_3$ ,  $\text{KF}$ ,  $\text{LiCl}$ ,  $\text{NaCl}$ ,  $\text{AcONa}$ ,  $\text{CaCl}_2$ ,  $\text{SrCl}_2$  and  $\text{BaCl}_2$ . The favorable effect of these added electrolytes has been explained in the case of  $\text{Zn}^{++}$  and  $\text{Ca}^{++}$

on the assumption that insol. manganites of these cations are formed but it is possible that the effect may be largely that of the coagulation of a colloid, whereby a part of the electrolyte is always adsorbed. An attempt to prep. manganites of representative elements of all groups of the periodic system (save the rare-gas group) was, therefore, made. By carrying out the Volhard titration with various added electrolytes there was distinct evidence of the formation of definite insol. compds. but in some cases it was apparently a case of adsorption only. The dried ppts. contained all of the Mn in the quadrivalent condition. Shaking freshly pptd.  $\text{MnO}_2$  with electrolyte gave rise to exactly the same ppts. Pure hydrated  $\text{MnO}_2$  was pptd. when the Volhard titration was carried out in the presence of  $\text{KNO}_3$  or of  $\text{NaNO}_3$ . In Group I of the Periodic System, the metals Li, Na, K, Rb and Cs do not form manganites when tested as described above. Cu forms a stable compd. corresponding to  $2\text{CuO} \cdot 9\text{MnO}_2$ , and 14 to 18  $\text{H}_2\text{O}$ . Ag forms a stable manganite  $\text{Ag}_2\text{O} \cdot 7\text{MnO}_2 \cdot 9\text{H}_2\text{O}$  but with Au less than 1% of this metal is contained in the ppt. In the second group the following stable manganites were obtained:  $2\text{MgO} \cdot 7\text{MnO}_2 \cdot 9\text{--}13\text{H}_2\text{O}$ ,  $\text{CaO} \cdot 7\text{MnO}_2 \cdot 11\text{--}14\text{H}_2\text{O}$ ,  $\text{SrO} \cdot 7\text{MnO}_2 \cdot 11\text{H}_2\text{O}$ ,  $\text{BaO} \cdot 7\text{MnO}_2 \cdot 7\text{H}_2\text{O}$ ,  $\text{CdO} \cdot 13\text{MnO}_2 \cdot 21\text{H}_2\text{O}$ ,  $\text{Hg}_2\text{O} \cdot 11\text{MnO}_2 \cdot 6\text{H}_2\text{O}$ . In fact all the members of this group except Be form manganites. In the third group,  $6\text{TiO}_2 \cdot 5\text{MnO}_2 \cdot 7\text{H}_2\text{O}$  is the only stable manganite. In Group IV the compds.  $2\text{SnO}_2 \cdot 5\text{MnO}_2 \cdot 2\text{H}_2\text{O}$  and  $\text{PbO} \cdot 4\text{MnO}_2 \cdot 8\text{H}_2\text{O}$  were obtained. In Group V,  $\text{V}_2\text{O}_5 \cdot 5\text{MnO}_2 \cdot 10\text{H}_2\text{O}$ , and  $\text{Bi}_2\text{O}_3 \cdot 7\text{MnO}_2 \cdot 10\text{H}_2\text{O}$ . In Group VI a ppt. obtained in the presence of U contained only 0.95 % of this element. In Group VII, Mn is the only element to give a manganite. In Group VIII,  $\text{--NiO} \cdot 6\text{MnO}_2 \cdot 11\text{H}_2\text{O}$  but with Pt the ppt. contained only 0.6% Pt.

W. T. H.

**A proposal for the determination of chromium and nickel in steel.** FRITZ SIMION. *Chem.-Ztg.* 46, 504 (1922).—Dissolve 2 g. of metal in *aqua regia*, nearly neutralize with NaOH and pour the hot soln. into an excess of NaOH and  $\text{Na}_2\text{O}_2$ . Filter and wash with the aid of suction. Use the filtrate for the detn. of Cr. Boil the ppt. with  $\text{NH}_4\text{OH}$  and  $(\text{NH}_4)_2\text{CO}_3$ , filter and det. Ni in the filtrate. The accuracy of these seps. was not tested.

W. T. H.

**A method for the analysis of technical nickel alloys.** K. BREISCH and K. CHALUPNY. *Chem.-Ztg.* 46, 481-2 (1922).—S, Si, Cu, Pb, C, and Co are detd. by the usual methods. The sepn. of Fe and Mn from Ni is accomplished by  $\text{NH}_4$  formate and formic acid, after which the sep. elements are detd. according to the standard methods.

W. A. MUDGE

**The determination of gases in iron.** P. OBERHOFFER and E. PIWOWARSKY. *Stahl u. Eisen* 42, 801-6 (1922).—The detn. of gases in iron and steel by decompn. with  $\text{HgCl}_2$  and  $\text{Br}_2$  was studied in comparison to the vacuum fusion process. The  $\text{HgCl}_2$  process consists in placing 10-20 g. of the filings in a bulb to which is connected another bulb contg. sufficient  $\text{HgCl}_2$  and 100-150 cc. of  $\text{H}_2\text{O}$ . The two connected bulbs are then evacuated completely and the  $\text{HgCl}_2$  soln. is poured onto the iron. The  $\text{HgCl}_2$  soln. should be previously cooled to prevent too violent action at first. The reaction is complete in 2-4 hours. A magnet is a convenient test for undecomposed iron filings. The gases are now pumped into a buret and analyzed in the usual way. Tests were made on basic open-hearth steels before and after deoxidation and on a commercial steel. The results show for 100 g. of the steel before deoxidation, by the vacuum fusion method, total gas 118.93 cc.,  $\text{CO}_2$  2.3 cc., CO 89.4 cc.,  $\text{H}_2$  23.17 cc.,  $\text{N}_2$  3.4 cc., by the  $\text{HgCl}_2$  process total gas 35.8 cc.,  $\text{CO}_2$  5.3 cc., CO 8.5 cc.,  $\text{H}_2$  18.8 cc.,  $\text{N}_2$  3.2 cc. The much larger total gas by the fusion method is accounted for by the CO evolved by the reaction between oxides and carbon or carbides. The increased amt. of H by the  $\text{HgCl}_2$  method is due to the side reactions,  $2\text{HgCl}_2 + 2\text{H} \longrightarrow \text{Hg}_2\text{Cl}_2 + 2\text{HCl}$  and  $\text{Hg}_2\text{Cl}_2 + 2\text{H} \longrightarrow 2\text{Hg} + 2\text{HCl}$ . The steel after deoxidation gives a similar comparison

between the methods but shows a less total gas and a somewhat greater ratio of  $\text{CO}_2$  :  $\text{CO}$ . The  $\text{Br}_2$  method is less convenient. The reaction cannot be done in complete vacuum owing to the high vapor pressure of  $\text{Br}_2$  so that only a water pump is used. The  $\text{Br}_2$  is frozen out as hydrate during the evacuation and allowed to melt before reacting, which is done cold; at low temperatures no hydrogen is evolved. The bromine method gives results comparable with the  $\text{HgCl}_2$  method except that the H is higher. Tests were made on acid open-hearth steels before and after oxidation. The authors conclude that the carbon gases as detd. by the  $\text{HgCl}_2$  and  $\text{Br}_2$  methods are somewhat high but much lower and more reliable than those by the fusion method. The  $\text{Br}_2$  method gives a very nearly correct  $\text{H}_2$  value. The total C gases are only slightly changed by deoxidation while the  $\text{H}_2$  increases in the acid open-hearth process and remains about the same in the basic process.

R. S. DEAN

**New method of study of gold and of silver in ores by means of the blowpipe.** AD. BRALY. *Compt. rend.* 174, 1065(1922).—The charge of ore, flux, and Pb is introduced into scorifiers 2 cm. in diameter which are placed on a fireclay support at a gentle inclination. A strong oxidizing flame is used, the slag formed cooling freely on the outside. The operation is continued until the button is reduced to the size of a millet seed when it is removed to a sheet of fireclay and acted on by the flame applied tangentially in such a manner as to leave the  $\text{PbO}$  formed on the fireclay. For Au and Ag ores the operation is prolonged until a button of the metal is obtained. With poor ores when the button is reduced to the size of a poppy seed it is necessary to complete the operation in a small LeBaillif capsule. This method omits cupellation and saves much time.

L. W. RIGGS

**Inadequacy of the "A. R." test for alkalis in calcium carbonate.** WILLIAM SINGLETON AND HOWELL WILLIAMS. *Analyst* 47, 252-4(1922).—In analyzing glass the results added up to about 108% and the trouble was traced to the presence of  $\text{NaCl}$  in the  $\text{CaCO}_3$  used in the J. L. Smith method of analysis. The "A. R." test is based on the assumption that  $\text{Na}_2\text{CO}_3$  can be removed from  $\text{CaCO}_3$  by boiling 5 g. of material with 50 cc. of water. Expts. show, however, that when  $\text{CaCO}_3$  is obtained by pptn. with  $\text{Na}_2\text{CO}_3$  the absorbed reagent can be removed only with great difficulty. Five extns. by boiling 10 min. with 50 cc. of water are insufficient to remove all the soda.

W. T. H.

**Discrimination between cesium and rubidium.** JOHN MISSENDEN. *Chem. News* 124, 362(1922).—The marked similarity between these 2 elements is pointed out and characteristic compds. of each element are described.

W. T. H.

**Phosphorus in hematite iron.** N. D. RISDALE. *Chem. News* 124, 370-2(1922).—Hematite Fe contg. about 0.2% P, 0.5% Ti and 0.15% As can be tested for P by the following method: Dissolve 2 g. of metal in 30 cc. of 5 N  $\text{HNO}_3$ . If gelatinous  $\text{H}_2\text{SiO}_3$  separates, add 1 g. of  $\text{NH}_4\text{F}$  and boil gently. Without removing deposited graphite, add 0.25 g.  $\text{KMnO}_4$  and heat 2 min. to make sure the P is fully oxidized to  $\text{H}_3\text{PO}_4$ . Add 0.6 g.  $(\text{NH}_4)_2\text{C}_2\text{O}_4$ , 7.7 g.  $\text{NH}_4\text{NO}_3$  and 1.5 g.  $\text{NH}_4\text{Cl}$  to dissolve  $\text{MnO}_2$  and to introduce requisite  $\text{NH}_4$  salts. Heat gently 2 min. after the soln. has cleared and add exactly 12 cc. of concd.  $\text{HNO}_3$ . Ppt. the P by adding 20 cc. of concd.  $(\text{NH}_4)_2\text{MoO}_4$  soln. (contg. about 150 g. per liter). Stir vigorously for 2 min. and let stand at least 5 more. Filter and wash 5 times with 10 cc. portions of 0.3 N  $\text{HNO}_3$ . Place a 100 cc. beaker under the funnel contg. the filtered ppt. and pour onto the ppt. 10 cc. of hot, 2.5 % citric acid soln. This serves to form ferric citrate with any Fe in the ppt. and thus aids the dissolving of the ppt. As soon as the citric acid soln. has percolated through the filter, add 5 cc. of 2.5 N  $\text{NH}_4\text{OH}$  and allow it to drain into the same beaker. Return the combined filtrate through the filter and catch the filtrate in the beaker in which the original pptn. took place. Wash the small beaker and filter with hot water; with careful work all the yellow ppt. will be dissolved and the filtrate will measure not more than 50

cc. If necessary evap. to 50 cc. At about 100°, add 50 cc. of cold, ferric-nitro-molybdate reagent and reprecipitate the P. Finish the analysis by alkalimetric titration in the usual way.

W. T. H.

**Determination of the sulfate ion by precipitation as barium sulfate.** K. P. CHATRAPAN. *Z. anorg. allgem. Chem.* 121, 123-34(1922).—In pptg.  $\text{SO}_4^{--}$  with  $\text{BaCl}_2$  soln. the resulting  $\text{BaSO}_4$  is likely to adsorb some chloride. According to the expts. here described, an excess of  $\text{HCl}$ , up to a certain limit, causes more positive error than an excess of  $\text{BaCl}_2$  by itself. It is recommended that the soln. should not contain more than 0.1 % of  $\text{HCl}$  by vol.

W. T. H.

**The determination of the sulfate content of sodium sulfate.** MOTARO MATSUI AND SEN-ICHI KIMURA. *J. Chem. Ind. (Japan)* 24, 1039-53(1921).—By using pure  $\text{Na}_2\text{SO}_4$  and weighing the  $\text{BaSO}_4$ , the following 5 methods of carrying out the pptn. were tested: (A) the slow method of Allen and Johnston (*C. A.* 4, 1955); (B) the rapid method of Allen and Johnston (*C. A.* 4, 1955); (C) the method of Johnston and Adams (*C. A.* 5, 2456); (D) the method of Allen and Bishop (*C. A.* 6, 3245); and (E) the method of Hintz and Weber (*Z. anal. chem.* 31, 1906). As expected, the results obtained by very slow pptn. of  $\text{BaSO}_4$  were always low but if corrections were applied for the  $\text{BaSO}_4$  remaining in the filtrate, for the  $\text{BaCl}_2$  occluded by the ppt. and for the occluded  $\text{Na}_2\text{SO}_4$ , the best results were obtained by this method. All methods gave good results when these corrections were applied but method E gave the best results without applying any correction.

S. T.

**The analysis of polythionates.** ALBIN KURTENACKER AND ALBERT FRITSCH. *Z. anorg. allgem. Chem.* 121, 335-43(1922).—K. and F. have recently published a method for the detn. of tetrathionate (*C. A.* 15, 3430) based upon the treatment with  $\text{CN}^-$  and titration of the resulting  $\text{S}_2\text{O}_6$  with  $\text{I}_2$ .  $\text{S}_4\text{O}_6^{--} + 3\text{CN}^- + \text{H}_2\text{O} \rightarrow \text{S}_2\text{O}_4^{--} + \text{SO}_4^{--} + \text{CNS}^- + 2\text{HCN}$ . According to Raschig,  $\text{S}_4\text{O}_6^{--}$  reacts with  $\text{CN}^-$  according to the equation  $\text{S}_4\text{O}_6^{--} + 3\text{CN}^- + \text{H}_2\text{O} \rightarrow \text{SO}_3^{--} + \text{SO}_4^{--} + \text{CNS}^- + 2\text{HCN}$ . It seemed, therefore, that if the latter reaction took place under the conditions proposed for the analysis of  $\text{S}_4\text{O}_6^{--}$  it would be possible to analyze a mixt. of  $\text{S}_2\text{O}_6^{--}$  and  $\text{S}_4\text{O}_6^{--}$ , first detg. the sum of the two and then treating the titrated soln. for  $\text{S}_4\text{O}_6^{--}$  again. Expts. showed, however, that the  $\text{S}_4\text{O}_6^{--}$  reaction with  $\text{CN}^-$  takes place slowly and the results are low and inaccurate unless at a boiling temp. in which case some  $\text{S}_4\text{O}_6^{--}$  is changed to  $\text{SO}_3^{--}$ . According to Raschig  $\text{S}_4\text{O}_6^{--}$  reacts with  $\text{SO}_3^{--}$  as follows:  $\text{S}_4\text{O}_6^{--} + \text{SO}_3^{--} \rightarrow \text{S}_2\text{O}_6^{--} + \text{S}_2\text{O}_3^{--}$  and the  $\text{S}_4\text{O}_6^{--}$  content can be detd. by the decrease in the  $\text{I}_2$  titer of the  $\text{SO}_3^{--}$  soln. Good results were not obtained in testing this method. Riesenfeld and Feld proposed the titration of polythionates by weighing the  $\text{CuS}$  formed as follows:  $\text{S}_2\text{O}_6^{--} + \text{Cu}^{++} + 2\text{H}_2\text{O} \rightarrow \text{CuS} + 2\text{SO}_4^{--} + 4\text{H}^+$ . Tests with this method show that it gives good results with pure  $\text{S}_2\text{O}_6^{--}$  solns. but is useless when other polythionates are present. Riesenfeld and Feld have also claimed that  $\text{S}_4\text{O}_6^{--}$  is an unstable ion and that when formed by  $\text{I}_2$  titration it breaks down into a mixt. of various other polythionates. This is shown to be untrue. In fact  $\text{S}_4\text{O}_6^{--}$  is proved to be more stable than would be expected from reading the literature and the observed unstability has been caused by impurities.

W. T. H.

**Aluminium for the arsenic reaction.** G. ROMIJN. *Chem. Weekblad* 19, 177-9 (1922).—Al is recommended for evolving  $\text{H}_2$  in the Bettendorf test; a crystal of  $\text{SnCl}_2$  is added to facilitate the formation of the gas. It is recommended to use small vessels for the reaction, the total amt. of liquid not being more than 2.5 cc. Thin smooth paper impregnated with  $\text{HgCl}_2$  is used as a reagent.

R. BEUTNER

**Invisible mirrors of arsenic, antimony and bismuth.** HERMANN SCHEUCHER. *Monatsh.* 42, 411-20(1922).—The micro-Bettendorff reaction (reduction of  $\text{As}_2\text{O}_3$  or



$As_2O_3$  by  $SnCl_4$ ) is sensitive in a diln. of 1 : 250,000 or an abs. Asamt. of 0.02 microgram. Various metals interfere with the test, but Sb, Sn, Pb, Cu, Cd, and small amts. of acids do not. A method is described by which this method is used for testing for invisible As mirrors obtained by the Marsh test. In the case of Sb, it is claimed that 0.001 microgram can be detected. C. J. WASSER

The gravimetric determination of phosphine and a new apparatus for gas analysis. L. MOSER AND A. BRUKL. *Z. anorg. allgem. Chem.* 121, 73-94(1922).—Most of the methods for the detn. of  $PH_3$  are applicable only to dil. mixts. The best way to prepare pure phosphine is by the decompn. of AIP with dil.  $H_2SO_4$ . The phosphide is made by igniting with Mg ribbon a mixt. of Al and red P.  $CrO_3$  in the presence of  $H_2SO_4$  or AcOH and various concns. of  $H_2O_2$  have very little oxidizing effect upon phosphine gas. HgO on asbestos reacts vigorously and Hg is deposited. An aq. soln. of  $HIO_3$  reacts rapidly with phosphine and furnishes the simplest method for its detn. A 2 N soln. is most suitable. Small quantities of spontaneously combustible phosphine are formed when the gas is bubbled through the  $HIO_3$  soln. but the fumes settle down upon the surface of the absorbent and eventually are oxidized and disappear. In the cold, the absorption is complete but a mixt. of  $H_3PO_4$  and  $H_2PO_3$  is obtained. If, after the absorption, all of the  $I_2$  is distilled off in a current of  $CO_2$  the remaining soln. will contain all of the P as  $H_3PO_4$  and it is immaterial whether the liberated  $I_2$  is titrated or the  $H_3PO_4$  detd. as  $Mg_3P_2O_7$ . The oxidation of the  $PH_3$  takes place as follows under these conditions:  $8HIO_3 + 5H_3P \longrightarrow 5H_3PO_4 + 4I_2 + 4H_2O$ . The gravimetric method of analysis is recommended. If  $PH_3$  is led into an excess of dil.  $AgNO_3$  soln. the resulting ppt. contains varying amts. of Ag but if an excess of  $PH_3$  is led into  $AgNO_3$ , the ppt. is nearly pure  $Ag_3P$ . This is a velvety, black substance which is easily oxidized and cannot be dried without decompn. When  $PH_3$  is led into an excess of  $AgNO_3$  soln. the following reactions take place:  $3AgNO_3 + H_3P = Ag_3P + 3HNO_3$  (1).  $Ag_3P + AgNO_3 + 2H_2O = H_3PO_3 + 4Ag + HNO_3$  (2).  $H_3PO_3 + 2AgNO_3 + H_2O = H_3PO_4 + 2Ag + HNO_3$  (3). The  $H_3PO_3$  reacts very slowly upon more  $AgNO_3$ .  $H_3PO_4 + 2AgNO_3 + H_2O = H_3PO_4 + 2Ag + 2HNO_3$  (4). By the addition of these 4 equations, one gets  $8AgNO_3 + H_3P + 4H_2O = H_3PO_4 + 8Ag + 8HNO_3$ . During the absorption there are likely to be slight explosions and to prevent losses a special *absorptiometer* was devised. The instrument consists in the first place of a capillary tube which passes through a 3-way glass stopcock and then into a 120 cc. bulb which in turn leads to a 3 mm. tube that dips into a beaker contg. the absorbent. The bulb is filled with absorbent up to the stopcock and then connected with the buret contg. the gas. The gas is driven over into the bulb and shaken into the absorbent. Expts. on the absorption of  $PH_3$  by coned.  $AgNO_3$  indicated that a colloid of the compn.  $Ag_3P \cdot 3AgNO_3$  is formed as has been assumed by others. With ammoniacal Ag soln. the reaction is very rapid and an attempt was made to det. the  $PH_3$  on the basis of the wt. of deposited Ag but the results were always a little low. With  $HgCl_2$  the absorption of  $PH_3$  takes place readily according to the following 3 stages:  $6HgCl_2 + 2H_3P \longrightarrow 3HgCl_2 \cdot Hg_3P_2 + 6HCl$  (1);  $6HgCl_2 + H_3P + 3H_2O \longrightarrow H_3PO_3 + 6HCl + 3Hg_2Cl_2$  (2);  $8HgCl_2 + H_3P + 4H_2O \longrightarrow H_3PO_4 + 8HCl + 4Hg_2Cl_2$  (3). After the absorption is complete the  $H_3PO_4$  can be pptd. as  $MgNH_4PO_4$  after complete oxidation by  $HNO_3$ . With  $AuCl_3$  the absorption of  $PH_3$  takes place as follows:  $3AuCl_3 + H_3P + 3H_2O \longrightarrow 3AuCl + H_3PO_3 + 6HCl$ ;  $4AuCl_3 + H_3P + 4H_2O \longrightarrow 4AuCl + H_3PO_4 + 8HCl$ ;  $3AuCl + H_3P \longrightarrow Au_3P + 3HCl$ ;  $3Au_3P + AuCl_3 + 6H_2O \longrightarrow 10Au + 3H_3PO_4 + 8HCl$ ;  $3H_3PO_3 + 2AuCl_3 + 3H_2O \longrightarrow 2Au + 3H_3PO_4 + 6HCl$ ;  $3H_3PO_3 + 2AuCl_3 + 3H_2O \longrightarrow 2Au + 3H_3PO_4 + 6HCl$ . The complete reaction is, therefore,  $8AuCl_3 + 3H_3P + 12H_2O = 8Au + 24HCl + 3H_3PO_4$ . After the absorption is complete, the residual  $Au^{+++}$  can be pptd. by  $H_2S$  and the P detd. as pyrophosphate after oxidation with Br

aq. Good results were also obtained with  $\text{CuSO}_4$  soln. as absorbent. The absorption then takes place as follows:  $3\text{CuSO}_4 + \text{H}_3\text{P} + 3\text{H}_2\text{O} \rightarrow \text{H}_3\text{PO}_4 + 3\text{Cu} + 3\text{H}_2\text{SO}_4$ ;  $4\text{CuSO}_4 + \text{H}_3\text{P} + 4\text{H}_2\text{O} \rightarrow \text{H}_3\text{PO}_4 + 4\text{Cu} + 4\text{H}_2\text{SO}_4$ ;  $3\text{CuSO}_4 + 2\text{H}_3\text{P} \rightarrow \text{Cu}_3\text{P}_2 + 3\text{H}_2\text{SO}_4$ ;  $\text{Cu}_3\text{P}_2 + 3\text{Cu} = 2\text{Cu}_3\text{P}$ . After the absorption the soln. was oxidized by Br and the Cu pptd. by  $\text{H}_2\text{S}$ . The P was detd. as  $\text{Mg}_2\text{P}_2\text{O}_7$ . With solns. of Pb, Bi and Cd the results were not as satisfactory. In the gravimetric detn. of  $\text{PH}_3$  there is little choice between any of the five methods recommended but perhaps the use of  $\text{CuSO}_4$  as absorbent is least desirable.

W. T. H.

**Quantitative micro-analysis of mixtures with particular regard to elementary organic analysis.** A. BENEDICTI-PICHLER. *Z. anal. Chem.* 61, 305-31(1922).—An interesting mathematical discussion of the problem involved in getting a small amt. of material to be representative of a large quantity, illustrated by some practical expts. It is shown, for example, how a sample weighing only 3 mg. may be representative of a carload of coal. A study of the article tends to increase one's confidence in analytical results obtained from small wts. of material.

W. T. H.

**A quick method for determining acetic acid and butyric acid in mixtures.** L. NOTENBAART. *Natuurwetenschapp. Tijdschr.* 3, 131-4(1921).—The total quantity of the two acids is first detd. by titrating with 0.04 N NaOH. The mixt. is then shaken with an equal vol. of toluene which exts. most of the butyric acid and little of the acetic acid. After shaking the aq. soln. is titrated again. From these two titrations the calcn. of each of the two acids is possible on the basis of previous *exptl. detn. of the distribution of acetic acid and butyric acid between water and toluene*. This is detd. by shaking equal quantities of a pure acid in a concn. varying from 0.2% to 3.0% with toluene and by titrating before and after shaking. Per 5 cc. acetic or butyric acid the following *differences of titration* with 0.04 N NaOH were observed:

Concn. of the acid	0.2%	0.5%	1.0%	3.0%
Difference of cc. NaOH for acetic acid	0.005	0.0225	0.045	0.085
Difference of cc. NaOH for butyric acid	0.12	0.38	0.95	2.87

R. BEUTNER

**Determination of sulfur and oxygen in organic compounds.** H. TER MEULEN. *Chem. Weekblad* 19, 191-2(1922).—By a method previously devised by M. (C. A. 16, 2064) S can be detd. directly in org. compds. The O content of an org. compd. can be converted quantitatively into  $\text{H}_2\text{O}$  by heating in a current of pure  $\text{H}_2$ ; Ni must be used instead of platinum as contact-agent. A clear quartz tube is used to heat the substance; the products of dry distn. which are formed at first—*viz.*  $\text{CO}$ ,  $\text{CO}_2$ ,  $\text{CH}_4$  and  $\text{H}_2\text{O}$ —are conducted over nickel-asbestos at  $350^\circ$ . If the catalyzer is fresh all O will be converted into  $\text{H}_2\text{O}$ ; if it has been often used a part of the  $\text{CO}_2$  is not reduced; this, however, may be absorbed by soda-lime and the O content calcd. from the wt. The O content detd. directly according to this method in succinic acid, phenol, cane sugar and ethyl alcohol differed from the theoretical values up to 0.5 %.

R. BEUTNER

**Falsification of documents and methods for its detection.** A. BRÜNING. *Ber. pharm. Ges.* 32, 30-3(1922).—A brief outline of the falsifications commonly encountered and of the chem., microscopic and photographic methods usually applied thereto.

W. O. E.

**The rational use of filter papers.** E. J. GUILD. *Chem. Trade J.* 70, 721-2(1922).—The method of making filter papers of different qualities is outlined and the advisability of using suitable filter paper is pointed out.

W. T. H.

**Detecting methane or other gases.** C. H. M. ROBERTS. U. S. 1,421,720, July 4. The gaseous mixt. to be tested, *e. g.*, mine gases which are to be tested for the presence of  $\text{CH}_4$ , is passed between opposed spaced electrodes maintained at low potential and

the amt. of current passing across the gap between the electrodes serves to indicate the compn. of the gas.

## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND WALTER F. HUNT

Dolomite from Binn, Switzerland. PAUL KOLLER. *Neues Jahrb. Min. Geol. Beil.-Bd.* 42, 457-98(1918).—A detailed crystallographic description is given of the colorless water-clear crystals from the saccharoidal dolomite-rock. Crystals of another type from the same occurrence are transparent with a pale yellowish tinge; these have  $\omega = 1.6799$ ,  $\epsilon = 1.5013$ , and gave analyses I and II by P. POOTH.

	CaCO <sub>3</sub>	MgCO <sub>3</sub>	FeCO <sub>3</sub>	Sp. gr.
I .....	53.38	46.45	0.13	2.882
II .....	53.19	46.52	0.09	—
III .....	52.35	46.02	1.79	2.887

Both these analyses show a slight excess of magnesia over that required by normal dolomite, I corresponding to 32CaCO<sub>3</sub>, 33MgCO<sub>3</sub>, and II to 26CaCO<sub>3</sub>, 27MgCO<sub>3</sub>. Corresponding with the low percentage of Fe, the  $\eta$ s. are lower than any previously detd. for dolomite. Analysis III is of dolomite form Scalegia, Disentis, corresponding with FeCO<sub>3</sub>, 36CaCO<sub>3</sub>, 37MgCO<sub>3</sub>. Etching expts. were made on cleavage flakes with sulfuric, nitric, hydrochloric, acetic, and formic acids, each of which produces different forms of etch-figures, as does the same acid when of different concns. The material of analyses I and II yielded the same type of etch-figures, but the more ferruginous dolomite is rather more readily attacked.

J. C. S.

The melting of potash feldspar. G. W. MOREY AND N. L. BOWEN. *Am. J. Sci.* 4, 1-21(1922).—Pure synthetic orthoclase was prepared by crystg. a glass of the compn. KAlSi<sub>3</sub>O<sub>8</sub> in a bomb with H<sub>2</sub>O vapor. It was found that above 1170° this pure orthoclase decomposed into a liquid and leucite, the leucite becoming more apparent with increased temp. up to 1530°, where it disappeared. The significance of this fact to petrogenetic theory is discussed.

EDW. F. HOLDEN

Optical investigation of the new pyroxene sobralite. JOSÉ M. SOBRAL. *Bull. Geol. Inst. Univ. Upsala* 18, 47-56(1922).—This shows no pleochroism in sections as thick as 0.05 mm.;  $2V = 41^\circ$ ; +;  $\rho < \nu$ ,  $\beta - \alpha = 0.0025$ ,  $\gamma - \beta = 0.0175$ ,  $\gamma - \alpha = 0.0200$ ,  $n_m < 1.74$ , ext. inclined in all sections.

EDW. F. HOLDEN

Hornblende from the Swedish eulysite. JOHN PALMGREN. *Bull. Geol. Inst. Univ. Upsala* 18, 33-46(1922).—Terminated hornblende crystals from Gillinge and Nyberg are described. Anal. by Mauzelius gave: SiO<sub>2</sub> 38.73, TiO<sub>2</sub> 0.05, Al<sub>2</sub>O<sub>3</sub> 12.51, Fe<sub>2</sub>O<sub>3</sub> 4.80, FeO 15.57, MnO 2.28, MgO 7.44, CaO 11.87, Na<sub>2</sub>O 0.64, K<sub>2</sub>O 3.87, H<sub>2</sub>O 1.88, F 1.12, —O 0.51, sum 100.25%; sp. gr. 3.34.

EDW. F. HOLDEN

Chemical constitution of zeolites. G. TSCHERMAK. *Sitzb. Akad. Wiss., Wien* 126, 541-606(1917); 127, 177-289(1918).—Twenty-one new analyses are given of various zeolites. In all cases the ratio Al : Ca(Sr,Ba) + Na<sub>2</sub>(K<sub>2</sub>) is 2 : 1. Omitting O all zeolites may be represented by the formulas Si<sub>2</sub>Al<sub>2</sub>CaH<sub>2</sub>, and Si<sub>2</sub>Al<sub>2</sub>Na<sub>2</sub>H<sub>2</sub>, where  $x$  and  $s$  range from 2 to 10, and  $y$  and  $v$  from 2 to 9. Or again, neglecting H, they all contain a group Si<sub>2</sub>Al<sub>2</sub>CaO<sub>3</sub> or Si<sub>2</sub>Al<sub>2</sub>Na<sub>2</sub>O<sub>3</sub>. This group is regarded as a nucleus ("Kern") and represented as Kc or Kn, respectively (also Kb and Ks for the corresponding Ba and Sr nuclei). The various zeolites are regarded as compds. of one or other of these nuclei with a silicic acid, combined H<sub>2</sub>O and water of crystn. The silicic acid and water of hydration are supposed to form a network enclosing the nuclei. Such a structure is regarded as offering an explanation of the variation of the optical characters of the

zeolites with loss or gain of water, the various adsorption phenomena, and the ease with which the bases may be replaced. The following is a summary of the different groups: *A.* Orthosilicates in combination with  $\text{SiH}_4$  and  $\text{H}_2\text{O}$ : Natrolite,  $\text{SiH}_4\text{K}\pi = \text{Si}_4\text{Al}_4\text{Na}_2\text{H}_4\text{O}_{12}$ . Scolecite,  $\text{SiH}_4\text{KcOH}_2 = \text{Si}_4\text{Al}_4\text{CaH}_4\text{O}_{12}$ . Mesolite, a double salt of these two in the ratio 1 : 2. Edingtonite,  $\text{SiH}_4\text{KbOH}_2, \text{aq} = \text{Si}_4\text{Al}_4\text{BaH}_4\text{O}_{12}$ . Gismondine,  $\text{H}_2\text{OKcO}_2\text{H}_4, \text{aq} = \text{Si}_2\text{Al}_2\text{CaH}_4\text{O}_{12}$ , also with  $\text{SiH}_4$  in place of  $\text{H}_2\text{O}$ . Laumontite,  $\text{SiH}_4\text{KcSiH}_2 = \text{Si}_4\text{Al}_4\text{CaH}_4\text{O}_{12}$ . Thomsonite, a double salt of the compds.  $\text{H}_2\text{O-KcOH}_2, \text{aq}$  and  $\text{H}_2\text{OKcOH}_2$  in the ratio 1 : 3; also in the latter  $\text{SiH}_4$  in place of  $\text{H}_2\text{O}$ . *B.* Disilicates combined with polysilicic acids and  $\text{H}_2\text{O}$ : Analcite,  $\text{Si}_2\text{H}_4\text{K}\pi = \text{Si}_4\text{Al}_4\text{Na}_4\text{H}_4\text{O}_{12}$ , also with  $\text{Si}_4\text{H}_4$ ,  $\text{Si}_4\text{H}_4$ , or  $\text{H}_2\text{O}$  in place of  $\text{Si}_2\text{H}_4$ . Faujasite,  $\text{Si}_4\text{H}_4\text{KcO}_2\text{H}_4, 4\text{aq}$ , also with  $\text{Si}_2\text{H}_4$ . Chabazite,  $\text{Si}_2\text{H}_4\text{KcO}_2\text{H}_4, 2\text{aq} = \text{Si}_4\text{Al}_4\text{CaH}_4\text{O}_{12}$ , also with  $\text{Si}_4\text{H}_4$ ,  $\text{Si}_2\text{H}_4$ , or  $\text{SiH}_4$ . Gmelinite with  $\text{K}\pi$  in place of  $\text{Kc}$ . Levynite like chabazite with  $\text{Si}_2\text{H}_4$  and  $\text{SiH}_2$ . Stilbite,  $\text{Si}_4\text{H}_4\text{KcOH}_2, 2\text{aq} = \text{Si}_4\text{Al}_4\text{CaH}_4\text{O}_{12}$ , also with  $\text{Si}_4\text{H}_4$ ,  $\text{Si}_2\text{H}_4$ , or  $\text{SiH}_4$ . Harmotome with  $\text{Kb}$  instead of  $\text{Kc}$ . Phillipsite like stilbite but with  $\text{Si}_2\text{H}_4$ ,  $\text{Si}_2\text{H}_4$ ,  $\text{SiH}_4$ ,  $\text{SiH}_2$ . Heulandite,  $\text{Si}_4\text{H}_4\text{KcO}_2\text{H}_4, \text{aq} = \text{Si}_4\text{Al}_4\text{CaH}_4\text{O}_{12}$ , also with  $\text{Si}_4\text{H}_4$ ,  $\text{Si}_2\text{H}_4$ , or  $\text{SiH}_4$ . Brewsterite with  $\text{Ks}$  in place of  $\text{Kc}$ . Mordenite like heulandite with  $\text{Si}_2\text{H}_4$ .

J. C. S.

**Chemical investigation of Japanese minerals containing rarer elements. IV. Samarskite and an unnamed mineral from Ishikawa, Iwaki Province.** YUJI SHIBATA AND KENJIRO KIMURA. *J. Chem. Soc. Japan* 43, 301-12(1922); cf. *C. A.* 16, 1921.—“Samarskite” from Ishikawa is considered to belong in the yttrantalite group by some Japanese geologists. According to S. and K.’s analysis, however, it is undoubtedly samarskite. The sample analyzed had d. = 5.50 and H. = 5-6. Its compn. was: MgO 0.25, CaO 1.25, MnO 0.84, FeO, 9.64,  $\text{Al}_2\text{O}_3$  0.61, rare earths 17.34,  $\text{UO}_2$  16.87,  $\text{SnO}_2$  0.73,  $\text{SiO}_2$  0.37,  $\text{TiO}_2$  0.10,  $\text{Cb}_2\text{O}_3$  41.11,  $\text{Ta}_2\text{O}_5$  10.00, and  $\text{H}_2\text{O}$  0.85%. Characteristic results of spectrum anal. are: In  $\text{SiO}_2$  group, trace of Pb, Ba; in  $\text{SnO}_2$  group, W; in rare earth group, Yt, Er, Dy, Gd, Sa, and trace of Sc and Tb were detected. These results show the compn. of Ishikawa samarskite to be very similar to that foreign ones except that the  $\text{UO}_2$  is slightly higher. The unnamed mineral analyzed was in non-transparent, black, lustrous crystals and had d. = 6.2-6.4, H. 5-6. Its compn. was: MgO 1.07, CaO 0.86, MnO 0.4, FeO 11.78,  $\text{Al}_2\text{O}_3$  0.87, rare earths 8.40,  $\text{UO}_2$  21.88,  $\text{SnO}_2$  1.20,  $\text{SiO}_2$  0.30,  $\text{TiO}_2$  0.21,  $\text{Cb}_2\text{O}_3$  36.80,  $\text{Ta}_2\text{O}_5$  15.00 and  $\text{H}_2\text{O}$  0.89%. Its formula is therefore:  $10 \text{ MO} \cdot \text{R}_2\text{O}_3 \cdot 6(\text{Cb}_2\text{Ta})_2\text{O}_6$ , where M = Fe, Ca, Mg, Mn,  $\text{UO}_2$  and R = rare earth metals. Spectrum anal. shows the presence of Pb, Ba, Sr in the  $\text{SiO}_2$  group; and Mn and very small trace of Zn in the Mn group; unlike samarskite, no W in the Sn group; and Yt, Er, Gd, Dy, and trace of Sa, La, Sc in the rare earth group. A comparison shows that it has far greater  $\text{UO}_2$  and far less rare earth metals than samarskite. It is quite different in properties from the minerals related to samarskite, but assignment of a name is withheld until a final analysis is made. S. T.

An aluminium phosphate from Arsitá near Jakubeny, Bukowina. O. GROSS-PIETSCH. *Verh. geol. Reichsanst. Wien* 1919, 149-55(1920).—A white colloidal alteration product of manganese silicate ores has been previously classed as planerite (Leitmeier, *C. A.* 10, 1487) but is now recognized to contain F and is regarded as a new mineral. The methods of anal. used are described in detail, with special reference to the disturbing influence of the F. The results were:  $\text{Al}_2\text{O}_3$  35.06,  $\text{Fe}_2\text{O}_3$  0.91, MnO trace,  $\text{SiO}_2$  4.23,  $\text{P}_2\text{O}_5$  28.18, F 4.40,  $\text{H}_2\text{O}$  28.70, adsorbed moisture 6.44, sum 107.92%. A highly complex constitutional formula is derived from this. [The approx. formula corresponding to these data is:  $3\text{Al}_2\text{O}_3 \cdot \text{AlF}_3 \cdot 2\text{P}_2\text{O}_5 \cdot 15\text{H}_2\text{O}$ . Abstractor.] E. T. W.

A new occurrence of ilsemaninite. C. W. COOK. *Am. J. Sci.* 4, 50-2(1922).—Near Gibson, Shasta Co., Cal. molybdenite occurs disseminated in aplite boulders. Ilsemaninite or a related substance is present as a bluish stain formed by the incom-

plete oxidation of molybdenite; it is supposed to be a mixture of Mo dioxide and trioxide.

EDW. F. HOLDEN

**The origin of primary ore deposits.** J. M. CAMPBELL. *Bull. Inst. Mining Met.* 1920, No. 193, 26 pp.; Discussion. *Ibid.* No. 194, 21 pp.; No. 195, 41 pp.; 1921, No. 200, 20 pp.—Current theories as to the origin and mode of formation of high temp. ore deposits are reviewed; magmatic differentiation is ascribed mainly, if not entirely, to absorption of  $H_2O$ . The properties of silica are considered, and it is concluded that "silicates are comparatively simple compds.," structural formulas being then written for a number of "silicic acids." The bearing of these on what takes place in the cooling of magmas is discussed. Among the ore minerals of acid magmas those containing Mo, Sn, W, and Bi are the first to crystallize. It has long been supposed that these are deposited pneumatolytically, but as the fluoride of Sn boils above and that of W below magmatic temps., the ores of neither could have been thus formed. Moreover quartz is always associated. There is no proof that tourmaline and other minerals supposed to be evidences of pneumatolysis have really been so formed. The evidence suggests that these as well as other metals have been brought up from magmas as silicates, or as sulfides dissolved in silicic acid. Much importance has been placed on the supposed pneumatolytic minerals as indicating high temps. of deposition of the veins in which they occur. However, observations in mines show that the temp. limits within which any particular ore is developed are very narrow. The presence of metals in hot spring waters does not necessarily indicate magmatic origin, for they may have been dissolved from rocks through which the springs rise; but "we must attach great importance to the fact that so many hot springs are siliceous." It is accordingly concluded that the so-called mineralizers, the presence of which is accidental, do not perform any essential function in ore transportation; instead the substances always present in magmatic liquids, namely silica and water, must be credited with playing the principal role. Other points made are brought out in the discussion. C. G. CULLIS. The rarity of Cl minerals in association with ore deposits is an argument against extensive accession of surface and especially sea waters to magmas. The term pneumatolysis is defined by different investigators in various ways. It might well be limited to deposition of minerals from the gaseous state no matter what the temp. While Sn and W minerals usually deposit first, cases have been noted where Bi minerals preceded them. This may show the deposition to have first accompanied a rise in temp., with subsequent fall. J. W. EVANS. The principal agency concerned in transport of ores is  $H_2O$  under heavy pressure and above its critical temp. at ordinary pressures. All the other supposed agencies, such as F, B, and  $SiO_2$ , are merely chance companions of the ore compds. J. J. H. TRALL. The volatile constituents of silicate magmas cannot fail to influence the deposition of the solid compds. The contents of drusy cavities in granite throw light on the subject. Most magmatic differentiation is connected with fractional crystn. J. C. BROWN. Acidic margins of ultrabasic magmas may arise from progressive differentiation of the magmas, the last fractions being siliceous  $H_2O$ . The temp., succession and magma-distance relations are not constant from one region to another. W. H. GOODCHILD. The ore deposits under discussion are the igneous, not the only primary ones. The relations between a magma and a slag correspond to those between an acid and a normal salt; and silicates are analogous to sulfates. Fractional crystn. drives out the acid constituents so that they are the last to crystallize. The chemistry of silicate solns. outlined by Campbell is not acceptable to G. The fact that amorphous  $SiO_2$  dissolves in  $H_2O$  and crystallizes out as quartz does not prove that compds. are formed. The  $H_2O$  in magmas is not all dissociated into H and OH, nor held as hydroxysilicates, but all stages of dissociation as well as association are present. Pressure is, however, very important in detg. soly. and crystn. phenomena.

H. F. COLLINS. Silicates contg. OH are of lower sp. gr. than the corresponding anhydrous ones, and would not sink in magmas as Campbell suggests to account for assimilation of  $H_2O$ . J. W. GREGORY. The hypothesis that silicic acid is a carrier of metallic constituents of ores should be tested exptly. Deposits of quartz are common, but of these primary ores rare, which accords with the usual view that these ores require the aid of the correspondingly rare pneumatolytic agents. S. J. SPEAR. The colloidal properties of silicic acids may have important bearing on the question. The mere fact that one mineral crystallizes before another does not mean that it was deposited the earlier, for all may have deposited simultaneously, but crystd. successively. H. C. H. CARPENTER. Metallographic methods can aid in the soln. of problems like this and may well be more extensively applied. The term magma should be defined so that it is certain that everyone means the same thing. E. W. SKEATS. Veins are not always plainly formed by expansion on crystn., and metals are not always uniformly distributed in their deposits. A. B. EDGE. Some ore deposits, such as the pyrite of Spain, do not have sufficient  $SiO_2$  associated to consider this to have been a carrier of the constituents. The evidence in this case shows that  $H_2O$  above its critical temp. dissolved the pyritic material, transported it, and then as the temp. fell below  $365^\circ$  and the  $H_2O$  was eliminated rapid sepn. of pyrite took place. H. W. HIXON. Primary ores are deposited in the absence of free O, and therefore by juvenile and not meteoric waters. The heat relations also indicate that the  $H_2O$  is magmatic. W. H. GOODCHILD. Many of Campbell's views are hardly in agreement with chem., phys., and geological observation. However, his view that K compds. migrate outward is an important contribution. The feature which all the elements characteristic of these primary ores (Sn, W, Bi, etc.) have in common is their ability to form stable alk. salts (stannates, tungstates, etc.). These salts by the action of  $H_2O$  at high temps. form oxides of the metals (or sulfides in some cases where S is present also) and the liberated  $K_2O$  (or  $Na_2O$ ) is able to unite with  $SiO_2$  and at times other oxides and form silicate minerals. The mere fact that the fluorides of these metals do not fit in with the pneumatolytic theory is no proof that this theory is unacceptable in general. S. J. LERR. Many of Campbell's data and conclusions are unacceptable. Mineralizers are of prime importance. J. H. GOODCHILD. The whole earth's crust is continually undergoing change, and it is not essential that magmas take part in all of the processes. Much can be learned from the study of concretionary phenomena at the surface conditions, and may be worth more than exptl. evidence supposed to copy deep-seated conditions. E. HALSE. Hg sulfide minerals are known to be deposited by hydrothermal waters even in the practical absence of silica. The silica deposited from them is likely to be colloidal. Barren quartz may be the first mineral to be deposited in veins, or the primary filling may be due to an alk. carrier, followed by a siliceous carrier. These facts are difficult to reconcile with Campbell's theory that silicic acid is the universal carrier of metalliferous minerals. Author's reply. J. M. CAMPBELL. The objections raised by many of the above critics can be successfully met; this is done in detail. As a final conclusion it is held that  $H_2O$  is of much greater importance than all the other mineralizers combined; although others may act as transporters of metals under certain conditions, none of them are really essential. More facilities are needed, especially in Great Britain, for doing accurate exptl. geophys. work. E. T. W.

**Iron.** H. H. HAYDEN. *Rec. Geol. Survey India* 52, 115(1921); *Bull. Imp. Inst.* 19, 541-2(1921).—Three deposits are described in which the compn. varies as follows: Fe 60-67.65%,  $P_2O_5$  0.082-0.043%,  $SiO_2$  1.58, Mn 0.42, S 0.012%. R. L. SIBLEY

**Iron ore deposits in the Namib desert.** P. A. WAGNER. *S. African J. Ind.* 4, 747(1921); *Bull. Imp. Inst.* 19, 543(1921).—The ores are highly siliceous and not suitable as a source of Fe. The deposits are all of a sedimentary origin and consist of

itabirite. A selected sample of richness above the average gave on anal.: Fe 57.7, SiO<sub>2</sub> 17.6, P<sub>2</sub>O<sub>5</sub> 0.05, S 0.35%. R. L. SIBLEY

The siderite occurrence at the Büffelstollen mine near Lobenstein. H. HAF. *Z. prakt. Geol.* 1922, 77-81.—Metamorphic rocks contain seams of siderite with calcite, quartz, pyrite, and chalcopyrite, averaging 1.6-1.8 m. thick. The crude ore runs 36-9% Fe, 2% Mn; after roasting the content is 50-6% Fe, 2.5-3% Mn. E. F. H.

Derry feldspar quarry. N. B. DAVIS. *J. Am. Ceram. Soc.* 5, 294-8(1922).—The Derry quarry is a large one, near Buckingham, Quebec. A typical anal. is: SiO<sub>2</sub> 65.4, Al<sub>2</sub>O<sub>3</sub> 19.3, Fe<sub>2</sub>O<sub>3</sub> 0.03, CaO 0.16, K<sub>2</sub>O 12.9, Na<sub>2</sub>O 1.9%. C. H. KERR

Carbon ratios of coals in West Virginia oil fields. D. B. REGER. *Trans. Am. Inst. Mining Met. Eng.* 65, 522-7(1921).—A map showing the main productive oil and gas fields of W. Va. together with "isocarb" lines for the coal-bearing area is given. The main oil pools lie within the limit of isocarb 60 although some few oil pools and gas wells occur where the average C ratio is 65 to 69. R. L. SIBLEY

Genetic problems affecting search for new oil regions. DAVID WHITE. *Trans. Am. Inst. Mining Met. Eng.* 65, 176-98(1921).—Our most productive oil deposits are, in general, found in districts containing formations in which there is evidence of abundant life, with ample vegetal matter. No commercially important oil fields have yet been discovered in any area where the fuel ratios of the coals occurring in the formations in which oil is sought, or in overlying formations, exceed 2:3. Oil in com. amts. should not be expected in localities where the regional carbonization has passed the limit of fuel ratio 2.0 or 66% fixed carbon. Oils in regions of relatively high but not too high carbonization are characteristically of the highest grade, that is, of low sp. gr. while in oils of less carbonization the oils average higher in sp. gr. Oils found in regions of low rank coals, such as lignite, are also characteristically lowest in rank. R. L. SIBLEY

Resumé of Pennsylvania-New York oil field. R. H. JOHNSON AND S. HUNTER. *Trans. Am. Inst. Mining Met. Eng.* 65, 151-5(1921).—The strata show a succession of porous sand and conglomerate horizons alternating with numerous gray and dark brown or black shales. It is estd. that the present exhaustion of the field is 69.5%. The tendency is toward deeper drilling. R. L. SIBLEY

Rise and decline in production of petroleum in Ohio and Indiana. J. A. BOWN-OCKER. *Trans. Am. Inst. Mining Met. Eng.* 65, 108-21(1921).—The oil in this field has a d. of 36-42° Bé. and is chiefly of paraffin base although some asphalt is present. S is an objectionable constituent. Where the Trenton limestone yields oil or gas in com. amts. it is magnesian, while outside of the producing territory the rock loses its magnesian character. The structural features of the oil-producing sands in eastern Ohio are not conspicuous. Their persistence, texture and thickness vary greatly. Structure maps indicate homoclinal accumulations of the oil. The main controlling factor is lensing and differential cementation. R. L. SIBLEY

Irvine oil districts, Kentucky. S. ST. CLAIR. *Trans. Am. Inst. Mining Met. Eng.* 65, 165-75(1921).—In general, the oil accumulation has taken place under anticlinal conditions. In the producing areas, all folds and well-defined terrace structures have been productive. The Big Sinking area has 2 and in some places 3 pay sands with an aggregate thickness of 10-30 ft. Much of the pay sand is very porous and the oil in parts of the field is under considerable pressure. The d. of the oil is around 40° Bé. and the gasoline content above 30%. R. L. SIBLEY

Oil fields of Kentucky and Tennessee. L. C. GLENN. *Trans. Am. Inst. Mining Met. Eng.* 65, 122-39(1921).—Production in Tenn. is from a fissured part of the limestone and varies greatly in accordance with the size and extent of the fissures. The sp. gr. is from 36-38° Bé. About 98% of the Kentucky production comes from lime-

stones. In a limestone, the porous, fissured or cavernous condition is apt to be irregular in occurrence. Most of the Kentucky oil is dark green by reflected light but dark brown when seen by transmitted light in thin films. The oil ranges in sp. gr. from 26 to 45° Bé.

R. L. SIBLEY

**Oil possibilities in Northern Alabama.** D. R. SEMMES. *Trans. Am. Inst. Mining Met. Eng.* 65, 140-50(1921).—The most favorable area for future testing is the north-western portion of the state where the Trenton limestone would be the producing horizon. The degree of metamorphism increases not only near areas of deformation but in depth in any locality. Considering the structure, the lithologic character of the section and the evidence of the C ratios of the overlying Pennsylvanian coals, the area is undoubtedly worthy of further tests, provided they be well located on carefully detd. structure.

R. L. SIBLEY

**Petroleum resources of Kansas.** R. C. MOORE. *Trans. Am. Inst. Mining Met. Eng.* 65, 97-107(1921).—The Kansas oil producing districts comprize the northern portion of the so-called Mid-Continent field. The oil and gas deposits are confined almost wholly to rocks of the Pennsylvanian system which outcrop in a broad belt across eastern Kansas and Oklahoma, 1 consisting of a thick series of alternating shale and limestone with irregular beds of sandstone and some beds of coal. The crude petroleum has a sp. gr. ranging from about 20 to 40° Bé. or slightly higher. The fields are probably beyond the zenith of their production.

R. L. SIBLEY

**Geology of the Cement oil field.** F. G. CLAPP. *Trans. Am. Inst. Mining Met. Eng.* 65, 156-64(1921).—This field lies 60 m. northwest of the Healdton, Okla. field. The formations at the surface appear to be entirely of Permian age. The most persistent formation is a gypsum bed 20-80 ft. thick. Some gas and a showing of oil have been found in the field. There are several sandstones, limestones and shale beds of enough persistence that some correlations have been arrived at, predicting that the bearing sands will not be found at less than 3400 to 4200 ft.

R. L. SIBLEY

**Petroliferous rocks in Serra da Baliza.** E. P. DE OLIVEIRA. *Trans. Am. Inst. Mining Met. Eng.* 65, 241-4(1921).—Examn. of slides from dikes and sheets indicate that the rocks of the dikes are of ophitic structure while those of the sheets show great variety of structure and may vary from almost granular to basaltic. All the samples of sandstone have, when freshly broken, a distinct petroleum odor and many of them show small cavities from which exudes a heavy dark oil.

R. L. SIBLEY

**Oil fields of Russia.** A. B. THOMPSON AND T. G. MADGWICK. *Trans. Am. Inst. Mining Met. Eng.* 65, 17-89(1921).—Comparatively simple partial domes characterize the two great fields of Baku but both have flanks on one side where the oil-bearing series outcrop. The whole series of Tertiary strata in which the oil is secreted consists of unconsolidated clays, sandy clays and sands of all grades of fineness that readily break down when pierced by the drill. Drilling methods, production and yields realized in the different fields are described.

R. L. SIBLEY

**Oil fields of Persia.** C. M. HUNTER. *Trans. Am. Inst. Mining Met. Eng.* 65, 8-16(1921).—The oil-bearing region in Northern Persia belongs chiefly to the Tertiary period. Natural shows of petroleum are seen in a stratum of foraminiferous sandstone. To the south of Ahar, the greater part of the formations belong to the upper Carboniferous period. Faulting is prevalent in this range. East of Ahar are extensive shell beds resting on rocks of Pliocene age similar to those found at Baku; it is thought that the oil fields of Northern Persia are a continuation of those of Baku. The petroleum is believed to be of org. origin.

R. L. SIBLEY

**Some questions concerning the archean intrusive formations in middle and southern Sweden.** N. SUNDRUS. *Geol. För. Förh.* 43, 548-95(1921).—Table 1 gives for 38 primary granites, gneisses, etc.: mineral name, locality, name of investigator, and



numerical values for Or, Ab, An,  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ , and the sum of  $\text{Fe}_2\text{O}_3$ , FeO and MgO. Table 2 gives similar data for 60 younger granites, Table 3 for 41 leptytes and flints, and Table 4 for 22 Rapakivi granites. These are subgrouped according to the provinces in which they occur, and the rocks compared in detail. Triangular diagrams on Or-Ab-An lines are given for primary granites, the younger granites, the leptytes and flints, and the Rapakivi granites.

W. SÖGERBLOM

Shale in Spain. JUAN GAVALA. *Bol. Inst. Geol. España* 42, 265(1921); *Bull. Imp. Inst.* 19, 549(1921).—A bed of bituminous shale and an intercalated clay zone are described, 4 m. long, 1 m. wide and 400 ft. thick. The reserves are estd. at 24,000,000 tons which, with a 4% yield, would produce 960,000 tons of crude oil. R. L. SIBLEY

Salt efflorescences in Gottland. C. WIMAN. *Geol. För. Förh.* 43, 670-1(1921).—On the rain-protected parts of the cliffs at Korpklint, Gottland, occur chalk white efflorescences of  $\text{MgSO}_4$ , layers several cm. thick forming at the joints of the strata. Efflorescences are more marked in dry seasons. The  $\text{MgSO}_4$  is not sucked up from the sea water, nor driven up by the wind, but comes apparently out of the rock itself, since the joints are water carriers and are usually moist.

W. SÖGERBLOM

Some geological and biological effects of sulfate-bearing solutions on humus waters. A. G. HÖGBOM. *Bull. Geol. Inst. Univ. Upsala* 18, 239-61(1922).—After the unusually dry summer of 1914 many Swedish lakes sank very low. The exposed post-glacial soil was rich in sulfides, which were oxidized to efflorescent sulfates. When the lakes rose again these sulfates were dissolved in the water and caused the pptn. of the humus compds. which they contained, thus affecting fish and plants. E. F. H.

The formation of the Alsatian potash basin. PAUL FLOQUET. *Bull. soc. ind. Mulhouse* 88, 169-85(1922).—After describing the geological formation of the Alsatian potash basin and immediate vicinity, F. concludes that it was formed by deposition in a closed lagoon, or rather in a salt lake, fed by salt-bearing streams, which was placed in communication with the sea to the north of it on but one occasion, viz., when the fossil-bearing marls were deposited. He shows the analogy with the Dead Sea region, and how the formation of the basin can be explained by this theory. A. P.-C.

Catalog of Swedish geological, paleontological, petrographic and mineralogical literature for 1920. FR. E. ÅHLANDER. *Geol. För. Förh.* 43, 663-8(1921); cf. C. A. 15, 43, 1872.—A list of titles, names of authors, and references for 74 papers, arranged alphabetically by authors, covering investigations relating primarily to Sweden. Many are in English, and some are chem. in nature.

W. SÖGERBLOM

Crystallographic axes in stereochemical aspect (RINNE) 2.

### 9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, ROBERT S. WILLIAMS

Gold and silver in 1920. J. P. DUNLOP. U. S. Geol. Survey, *Mineral Resources of U. S., 1920*, Part I, 511-48 (preprint No. 28, published June 23, 1922). E. H.

Gold, silver, copper, lead and zinc in Colorado in 1920. CHAS. W. HENDERSON. U. S. Geol. Survey, *Mineral Resources of U. S., 1920*, Part I, 565-95 (preprint No. 30, published July 6, 1922). E. H.

Lead in 1921. C. E. SIEBENTHAL AND A. STOLL. U. S. Geol. Survey, *Mineral Resources of U. S., 1921*, Part I, 35-43 (preprint No. 6, published July 3, 1922). E. H.

Manganese and manganiferous ores in 1921. H. A. C. JENISON. U. S. Geol. Survey, *Mineral Resources of U. S., 1921*, Part I, 45-54 (preprint No. 7, published July 8, 1922). E. H.

**The story of tungsten.** W. C. BALKE. *J. Western Soc. Eng.* 27, 223-32 (1922).—A review of the manuf. and uses of W. E. H.

**The Pechey leaching process.** H. R. SLEEMAN. *Chem. Eng. Mining Rev.* 14, 252-4 (1922); cf. Smith, C. A. 16, 2659.—S.'s pat. for a similar process covers the creation or increasing of solvent power in soln. containing Fe sulfate by the use of Fe sulfide.  $\text{SO}_2$  is not used; it is easier and cheaper to use raw pyrite. The process is to be tried in heap leaching at Whim Well and Mons Cupri. Details of the operations planned are given. After crushing to  $1/2$  or  $1/4$  in. the fines will be sepd. and leached in tanks, while the coarse will be jigged and the tails piled for heap leaching. Thus about half the Cu will be recovered at once and the rest slowly. A. BUTTS

**Hydrometallurgy of copper.** B. DUFAUR. *Chem. Eng. Mining Rev.* 14, 222 (1922); cf. Smith, C. A. 16, 2659.—By special app. the formation of  $\text{H}_2\text{SO}_4$  and  $\text{Fe}_2(\text{SO}_4)_3$ , during the leaching of the Cu ores by  $\text{SO}_2$  gases from smelters, can be controlled. W. A. MUELLER

**Treatment of the copper impurity in lead ores smelted at the Sulfide Corporation's works, Cockle Creek.** D. C. M'GRUBER. *Proc. Australasian Inst. Min. Met.* 1920, 93-103.—In the refining of the lead bullion before putting it through the Parkes process, the Cu impurity is removed by drossing in Cu kettles. The "wet" dross obtained is sweated in a suitable furnace and the resulting dross contg. Pb 60-70, Cu 6.6, Fe 2.2, Zn 1.5, Sb 4.5, As 1.6 and S 4.5% is smelted in a small blast furnace with the necessary fluxes to produce a low-grade mat contg. about 23% each of Pb and Cu. This is worked up to a high-grade mat which is tapped when the Fe content is 2%, the Cu and Pb then being about 47% and 24%, resp. This product is crushed, roasted at 600-25°, so as to obtain about 7.5% of S as sulfate, and leached with hot dil.  $\text{H}_2\text{SO}_4$  at 70° until the soln. contains 7-8% Cu and is nearly neutral. The residue is agitated with hot 5-10%  $\text{H}_2\text{SO}_4$  until no further quantities of Cu are dissolved; it is then returned to the original lead blast furnace to recover its Pb and precious metal contents. The Cu liquors are purified by agitation with lime and Cu oxide (roasted mat or Cu ppt.) by means of a stream of air and steam. The resulting liquors contg. Cu 80 g., Zn 3.1 g. and Fe 0.15 g. per l. and traces of As are concd. in 750-gal. lead-lined vats fitted with steam coils, until the liquid attains a sp. gr. of 1.4, when it is run into a storage vat where it is further concd. by waste steam to 1.42 sp. gr.; it is then passed to the crystg. vat. The mother liquor is divided into two parts, one of which is treated with scrap Fe and the resulting Cu ppt. roasted and used as a source of Cu oxide, and the other added to the liquor in the purifier. The crystals of Cu sulfate obtained assay 99.23%  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  and 0.09% Zn, with traces of Ni and Fe, while the mother liquor contains 84 g. Cu and 11.0 g. Zn per l. J. S. C. I.

**Recovery of zinc from lead blast-furnace slags.** G. COURTNEY. *Proc. Australasian Inst. Min. Met.* 1920, 75-84.—Charges of ten tons of slag were heated in a reverberatory furnace with limestone and coke, and it was found that 35-40% of the Zn was expelled in the fume, but only when the temp. was above 1600°. Heating the slag in an elec. resistance furnace without addn. of reducing agents or fluxes expelled 60% of the Zn content in the fume, which assayed approx.  $\text{PbSO}_4$  15,  $\text{PbCO}_3$  5 and  $\text{ZnO}$  63%. The best results were obtained in the blast furnace by running a charge consisting of 100 pts. of slag, 17 pts. of limestone, and 34 pts. of coke. The charge assayed 3.6% Pb and 7.8% Zn, and yielded 70% of its Pb and 60% of its Zn content as fume, which assayed 63%  $\text{ZnO}$ , 25.4%  $\text{PbO}$ , and 8%  $\text{SO}_3$ . The tests showed that for economical recovery the slags should not contain much less than 15% Zn and that it is preferable to start with cold slag, as a considerable quantity of the Zn is evolved before melting and then hardly any more comes off until the temp. reaches 1600°. J. S. C. I.

**Blue powder in zinc smelting.** W. R. INGALLS. *Mining Met.* 1922, 13-14 (April).

—I. has collected from a no. of American and European spelter works their figures for the production of blue powder and other distn. residues contg. Zn that have to be redistd. In America these residues amt. sometimes to as much as 50% of the wt. of ore originally charged into the furnace, but the general av. may be taken as being about 33% and the Zn lost in the second distn. is about 30%. The European Zn distg. practice is better than the American with regard to the by-products, this being probably due to the type of furnace front used, to the enclosing of the condensers in deep closets, and to the custom of drawing the spelter only once each day. J. S. C. I.

**Development of metallurgical practice at the Hollinger mine.** P. A. ROBBINS. *Eng. Mining J.-Press* 113, 1093-7(1922).—A history of the metallurgical practice at the Hollinger mine, Ontario, Canada, in the extn. of gold from ore carrying \$31 to \$35 per ton. Amalgamation was discarded in favor of cyaniding. The plant consisted of 40 1500 lb. stamps, four 5' by 20' tube mills and classifiers, one spitzkasten, 48 Deister slime tables, four 30' Trent agitators, four 30' Dorr thickeners, 500 ton Moore filter, Merrill clarifying press, Merrill precipitating press, Steele-Harvey furnaces. Low-grade bullion was produced in one part of the plant, and high-grade bullion from the concentrates from the Deister tables. The cyanide soln. used on the concentrates contained 10 lbs. per ton of concentrates. That used on the lower-grade ore contained 1.1 lb. of cyanide per ton of ore. The pans and settlers were afterwards replaced by Dorr thickeners. The Trent agitators were replaced by Dorr agitators. The Moore filter unit was raised from 500 to 750 tons capacity per day. A countercurrent decantation plant was installed. Otherwise, the original stamps, tube mills, etc., were simply added to as the plant grew. The bullion was briquetted with  $PbO$ ,  $Na_2B_4O_7$ ,  $SiO_2$  and Fe and was smelted in a stack to Pb bullion and cupelled to 980° fineness. Each stamp crushed 16.5 tons per day, so that with the help of the tube mills 70% passed 200, mesh. Manganoid pebbles in the tube mills increased the output to 22 tons per stamp per day. Stamps were found better than ball mills on this hard ore. Crushing in cyanide solution and sliming gave far better results than crushing wet, amalgamating, dewatering and cyaniding. Filtering was more economical than continuous decantation. Balanced buckets and cable way were found better than belt conveyor for transporting ore. JAS. O. HANDY

**A proposed copper metallurgical process.** P. BURBIDGE. *Proc. Australasian Inst. Mining Met.* 1921, 1-14.—As a result of numerous lab. tests the following process is suggested: Sulfide Cu ores are ground to 30-mesh and roasted in a specially constructed revolving furnace at about 560° so as to obtain the max. proportion of sulfate in the calcines. The hot furnace discharge passes to a cone mixer to which is added sufficient  $H_2SO_4$  (spent electrolyte) to form a 1 : 1 pulp and to dissolve all the Cu and other sol. substances. The pulp is agitated with hot air until nothing further dissolves, the mud is allowed to settle, and the clear liquor decanted. The residue is washed by decantation on the countercurrent principle, the wash liquors being stored separately. A quantity of the strong liquor sufficient to provide, after removal of the Cu by electrolysis, enough acid to dissolve the acid-sol. Cu in the next charge, to acidify the purified mother liquor from the next charge before electrolysis, and to dissolve the Cu and Fe from the Ca sulfate residue from the  $NH_3$  treatment described below, is thoroughly oxidized by compressed air and treated with finely ground limestone to neutralize the acidity and ppt. the bulk of the Fe. The remaining Fe is removed by agitating the filtered liquor with a slight excess of Cu oxide obtained from the  $NH_3$  process, the ppt. being returned to the roasting furnace. The purified soln. is mixed with sufficient spent electrolyte from a previous process to make the acidity of the resulting liquid equal to 1%  $H_2SO_4$  and electrolyzed with a c. d. of 12 amp. per sq. ft.; graphite anodes are used and  $SO_2$  is passed from the calciner into the soln. during the process. The

remainder of the strong leach liquor together with the first wash liquors is treated separately with compressed air and limestone and the filtrate is agitated with milk of lime, as free from carbonate as possible, until all the Fe and a little Cu are pptd. The ppt. is returned to the calciner and the filtrate agitated with a further quantity of milk of lime to ppt. all the Cu as hydroxide. The filtered liquor is used to dil. the acid used in leaching and the ppt. is extd. in a sealed agitation vat with 20%  $\text{NH}_3$  soln., the residue being washed with weaker  $\text{NH}_3$  solns. The  $\text{NH}_3$  solns. are boiled with steam to ppt. Cu oxide, which is reduced to metal by water-gas and eventually melted. The  $\text{NH}_3$  is recovered and used again. The process is claimed to be very economical in reagents, which are all recovered, in water and in power; there are no foul or discarded solns. and no Cu is tied up in unfinished products. Precious metals are recovered from the tailings by cyaniding.

J. S. C. I.

**Dusting and volatilization losses during melting of cyanide precipitate and air refining of (gold and silver) bullion.** G. H. CLYVENGER, F. S. MULLOCK AND G. W. HARRIS. *Mining Met.* 1922, 11-15.—The ppt. obtained by adding Zn dust to cyanide solns. contg. Au and Ag is melted in oil-fired reverberatory furnaces under a flux of borax glass and bottle glass. The original ppt., contg. 75-85% Ag + Au and having a moisture content of 30-35%, is charged directly into the hot furnace, together with the min. of flux, and the slag is skimmed off from the melted bullion, which is then treated either by blowing low-pressure air over its surface or by bubbling high-pressure air through the molten metal. The losses during the melting operation av. 0.06-0.1% of the total Ag and 0.015-0.03% of the total Au in the charge, while in the second operation the losses are 0.01-0.05% and 0.002-0.013%, resp. The method of applying the air does not materially affect the Ag losses, but high-pressure air results in a greater loss of Au per unit of time, although as the refining is much more quickly carried out by this process, the ultimate Au loss is lower. Air refining removes practically all the base metals except Cu and yields a bullion very suitable for electrolytic refining.

J. S. C. I.

**The development of the blast furnace.** J. HENDERSON. *J. Chem. Met. Soc. S. Africa* 22, 178-84(1922).—Historical.

E. H.

**Desulfurization of molten cast iron.** L. SCHARLIEBE. *Giesserei Ztg.* 19, 43-54 (1922); *J. Soc. Chem. Ind.* 41, 296A.—A no. of expts. were carried out to det. the best conditions for removing S from cast-Fe by the Walter process, which consists in sprinkling on the surface of the molten metal a powder contg. oxidizing compds., giving rise to a highly basic, very fluid slag contg. several bases. The process may be satisfactorily carried out in the ladle immediately before pouring. On addn. of the powder to the molten metal a vigorous reaction sets in, and as high as 60% of the S is removed, while the metal is also freed from gases. Difficulty is experienced, however, in removing the slag formed, owing to its extreme fluidity, and no improvement is effected by the addn. of thickening compds. As silica causes the S to recombine with the Fe, the process cannot be carried out if the metal is covered with an acid slag or is contained in a furnace with an acid lining. The most satisfactory lining consists of a mixt. of granular magnesite bonded with 10% of fireclay, and the process may be advantageously performed in a fore-hearth lined with this mixt. The advantages obtained by the method are claimed to outweigh the extra cost.

C. C. DAVIS

**Waste-heat boilers in steel plants.** J. C. HAYES. *Blast Furnace and Steel Plant* 10, 355-6(1922).—The installation of waste-heat boilers in steel plants is becoming more and more important. In most modern plants the boilers are either being placed or space is left for their latter installation. A boiler for this purpose is differently arranged from the firing type, because ordinarily the larger part of the heat transmitted into the boiler water is from radiation; this is usually absent in waste gases. The boiler

must, therefore, be arranged so that the gases have greater contact with the boiler surfaces in order to prevent the stagnant film of gas from being present. An ordinary 75-ton open-hearth furnace is capable of yielding power equal to 350 boiler h. p. per hr. in steam of 180 lbs. pressure and 100° superheat.

W. A. MUELLER

The mode of operation and the heat efficiency of the cupola furnace with blast heaters. ALFRED HÖRNIG. *Giesserei Z.* 9, 246-8(1922).—The greatest disadvantages of the older cupola process have proved to be: (1) the reduction of CO<sub>2</sub> to CO above the zone of fusion; (2) considerable increase in S in the Fe; (3) concn. of slag in the region of the tuyères and (4) formation of light ashes. These faults are virtually overcome by the use of a blast heating equipment, such as the Schürmann furnace (cf. Hellmund, *Giesserei Z.* 9, 146(1922)).

C. C. DAVIS

Static notched bar testing. HERMAN A. HOLZ. *Chem. Met. Eng.* 26, 941-2 (1922).—A number of important advantages of the static method of investigating notch brittleness as carried out on the Humfrey machine are enumerated. V. O. H.

Steel additions to pig iron and "reversed chilled iron." E. PIWOWARSKY. *Giesserei Z.* 18, 356-9(1921); *J. Soc. Chem. Ind.* 41, 59-60A.—According to Bardenheuer (*C. A.* 15, 2820) "reversed chilled Fe" is originally white cast Fe in which carbide after solidification has been incompletely decompd. so that white spots are still present in the metal. These should have the appearance of ledeburite, but P.'s researches showed that this is not so. The cementite appears as single flaky spots and shows no eutectic, having rather the appearance of a secondary pptn. from the satd. mixed-crystal phase. A rapid supercooling above the formation temp. of the metastable eutectic results in a rapid addn. of C to the mixed crystals, and as the temp. falls, this C is pptd. as a secondary cementite, decompn. into free C and ferrite taking place only within a very small temp. range. This theory accounts for the net-work arrangement of the cementite in the metal. The origin of the supercooling phenomena is ascribed not only to a low pouring temp., but also to the S and O content of the metal, which increases with the solidification range. To avoid the formation of hard spots, the Si content which should be 5-6 times the S content should not be below 1.7%. To test the theory, increasing amts. of steel were added to a slightly hypereutectic cast Fe, so that eventually the mixt. was strongly hypoeutectic, when the castings, which contd. 40% steel, showed a large no. of hard points. On analysis the sample showed very strong O segregation, which also plays a prominent part in the formation of "reversed chilled Fe."

C. C. DAVIS

Metal for cast-iron car wheels. Y. A. DYER. *Iron Age* 109, 1504-6(1922).—Three distinct compns. are embodied in 1 mass: white, gray and mottled. The care necessary in blending cupola charges is considered.

V. O. HOMERBERG

The influence of varying preliminary treatment upon the structure and the properties of low-carbon ingot iron. O. BAUER. *Mitt. Materialprüfungsamt* 37, 245-59 (1919).—A great no. of expts. are tabulated, showing the effects of quenching and of annealing under various conditions. All tests were with Fe of the following compn.: C 0.106, S 0.044, Si trace, P 0.044, Mn 0.45, Cu 0.13, Ni 0.08, Cr 0.01. Cold rolling caused a considerable increase in extensibility (A) and tensile strength (B) with a simultaneous reduction in malleability (C). The extent of this cold rolling was of great influence on these changes in properties. By quenching from above 700°, a still greater increase in B was effected. This increase was greater than that obtained by cold rolling to 0.5 the original thickness. By quenching however the increase in A was not so great as that attained by cold rolling. The ratio 100 A/B was 94 for the cold rolled Fe, 66, 70, 83 for quenched Fe, the latter values depending upon the quenching temp. Correspondingly the quenched samples gave a higher C values than those cold rolled. It is recommended that in practice any desired increase in tenacity in a

weak Fe be effected by quenching instead of by cold rolling. The danger of fracture is not so great with quenched steel as with the relatively brittle cold rolled metal. Annealing at 500–600° of previously quenched Fe caused a considerable reduction in B and A with simultaneous large increase in C. Very considerable improvement in tenacity was accomplished by annealing Fe previously quenched at 820–920°. Dangerous internal stresses caused by rapid quenching or by cold rolling can thus be abolished. By regulating the temp. of annealing, the tenacity can be varied over a wide range without the change in form necessary in cold rolling. By cold rolling previously quenched and annealed metal, both A and B were increased. B was increased to a higher value than could be attained by quenching and then cold rolling to 0.5 the original thickness. The C values of the cold rolled samples were very low. For practice there appeared to be no advantage in cold rolling previously quenched and annealed low-C Fe. If high tenacity is desirable, it can be attained by quenching alone. The ratio of the hardness (H) to B (each expressed in kg. per sq. mm.) averaged 2.9, approx. the same as reported by previous observers. This ratio H/B was in all cases smaller for samples cold rolled to 0.5 their original thickness than for those rolled to 0.75 the thickness. This signifies that B increased relatively more by cold rolling than did H. Samples quenched at various high temps. showed approx. the same H/B values, showing a similar relative increase in B and H. Annealing at 500–600° resulted in no essential change in the H/B ratio.

C. C. DAVIS

**Influence of graphite on iron.** J. W. BOLTON. *Foundry* 50, 436–43(1922).—Sulfides occur in graphite flakes. It is quite likely graphitization of gray Fe proceeds below the transformation range. Graphitization may be regarded from the kinetic, or energy, viewpoint. Cooling time has much more influence on graphite size than compn. Grain growth of graphite is influenced by difference in graphite size, rate of cooling, presence of accelerating, or obstructing, agents in intermediate layers. S may occur in Fe as SO<sub>2</sub>. The high physical properties of semisteel are largely due to cumulative effect of certain factors which are enumerated. B. also describes a new metallographic method by which the action of the reagent may be studied while in effect. In addition much accumulated information has been arranged to give a clearer view of the subject.

V. O. HOMERBERG

**Molybdenum steels.** ANON. *Rass. min.* 56, 105–8(1922).—A resumé including Mo ores, the constitution and phys. properties of Mo steels and their heat and cold treatments.

C. C. DAVIS

**Selective case-hardening.** W. P. WOOD AND O. W. McMULLAN. *Chem. Met. Eng.* 26, 1077–80(1922).—A review of the literature establishes the fact that an electrolytically deposited plate of Cu furnishes the most satisfactory metallic coating to produce localized case-carburizing. Under many circumstances and conditions this method is the most satisfactory one in use. Non-metallic coatings have not heretofore proved generally successful under all conditions and exptl. work with various mixts. which have been recommended in the literature has shown that they are not uniformly successful. A non-metallic coating consisting of definite mixts. of Na<sub>2</sub>SiO<sub>3</sub> with either finely ground asbestos or Al<sub>2</sub>O<sub>3</sub> furnishes good protection from carburizing conditions. It is easily painted on the metal and may be easily removed by immersion in molten NaOH or by quenchings in H<sub>2</sub>O. CaCl<sub>2</sub> in the molten state is also useful in loosening these coatings. It is not thought that these coatings have universal application, but it is believed that there may be many times when their use may not only be possible but also profitable in heat-treating shops. The coatings mentioned above are not as efficacious in preventing decarburization as they are in preventing carburization.

V. O. HOMERBERG

**The changes which occur in carbon steel during thermal treatment.** A. POUCHOLLE.

*Bull. officiel direction recherches sci. ind. inventions* No. 31, 295-300 (May 1922).—By means of a modified Atwood machine, diagrams were made of the expansion and contraction of C steel (about 0.9% C) wires 1 m. long and 1 mm. in diameter on heating and cooling, the wire being heated by passing an elec. current through it. The diagrams obtained on hardening and on drawing the temper are reproduced and discussed, showing a single transformation point (about 680°) during annealing, a single transformation point (about 300°) in bringing to max. hardness, and a double transformation point for slight hardening.

A. P.-C.

The action of salt solutions on mild steel. J. A. JONES. *Chem. Trade J.* 70, 323-5 (1922).—One of the chief factors in the production of cracks is the presence of either internal or applied stresses which must exceed certain definite values. Tests were run with solns. of  $\text{Ca}(\text{NO}_3)_2$ ,  $\text{KOH}$ ,  $\text{NH}_4\text{NO}_3$ , and  $\text{NaNO}_3$ . The first cracks were formed in those plates which were thought to have the greatest internal stress. These stresses were gradually reduced by annealing but cracks still appeared although a longer time was required. A similar action of caustic alkalies was found. In all cases the cracks produced were intercrystalline. It was concluded that the solns. of nitrates yielded a product having such an action on the intercrystalline material that the intercrystalline cohesion is reduced.

E. F. PERKINS

Some causes of rejections in boiler tubes. H. G. CARTER. *Chem. Met. Eng.* 26, 1113 (1922).—Tubes are rejected chiefly on account of the following defects: crookedness, non-uniformity of wall thickness, seams, tears, excessive scale and brittleness as shown by expanding, flattening or hydraulic pressure tests. These defects are discussed.

V. O. HOMERBERG

Study and report on pitting and corrosion of boiler tubes and sheets, character of metal, methods of manufacture, construction of boilers, and quality of water considered. ANON. *Comm. Repl. Am. Railway Eng. Assoc. Bull.* 243, 493 (1921); *Railway Age* 72, 689 (1922).—A preliminary report. Survey of the field indicates electrolytic action as the chief cause and investigation will be made further with this in view. Results of a questionnaire and photographs showing typical conditions are given.

R. C. B.

Alloys with very low melting points. A. LASSIUR. *Bull. officiel direction recherches sci. ind. inventions* No. 31, 304-9 (May 1922).—L. prepd. alloys from the following pure com. metals which he had tested: Pb contg. traces of Mg, Sn, Bi, Cu, Ag; Cd contg. no appreciable quantities of other elements; Bi contg. traces of Cu and Ag; and Sn which was free from appreciable quantities of Sb, As and heavy metals. The m. p. was detd. by placing a piece of the alloy in a test-tube with a few cc. of water, immersing the tube in a 250-cc. beaker, heating so that the rise in temp. would be very slow in the neighborhood of the m. p., and observing the temp. at which the metal was completely liquefied.

Sn.	Pb.	Bi.	Cd.	M. p.
2	4	7.5	1.5	75-76°
19	33.1	33.6	14.3	94-96°
2	4	10	1.5	74-75°
4	4	7.5	1.5	75°
2	2	7.5	1.5	Very soft at 75°, molten at 80°
1	2	4	1	74-75°
2	4	5	2	Pasty at 77°, melts at 80°

These results are higher than those generally given for these alloys, which may be due to the metals used in prepg. them being purer than ordinary com. metals. An alloy of Pb 4, Cd 1.5, Bi 7.5, Sn 4, Hg 2 melts completely at 66-67°, and its hardness and appearance are comparable to those of the other alloys. On solidifying after standing

for some time in the molten condition it is practically homogeneous. It tarnishes under water, gaining slightly in wt., but does not corrode. The Hg lowers the m. p. without affecting the other properties. The cost (quotations of Dec. 14, 1921) is less than that of alloys without Hg.

A. P.-C.

**Occurrence of blue constituent in high-strength manganese bronze.** E. H. DIX, JR. *Trans. Am. Inst. Mining Met. Eng.* No. 1158-N, 16 pp. (1922).—When the hardening elements (Al, Sn, Fe, and Mn) are added to the 60-40 Cu-Zn alloy in sufficient quantities to produce a high-strength Mn bronze, a third constituent appears in the  $\alpha$ - $\beta$  prime complex, which has a characteristic blue color. The occurrence of this constituent in reasonable amts. is not necessarily accompanied by brittleness. Annealing for  $7\frac{1}{4}$  hr. at  $1560^{\circ}$  F., followed by either  $H_2O$  quenching or slow cooling, does not cause the disappearance of this constituent. This constituent, when examd. unetched, appears to be of a deeper blue than either the  $\delta$  constituent of the Cu-Sn series or the  $\gamma$  constituent of the Cu-Zn series. When etched with  $NH_4OH + H_2O_2$ , the blue constituent is unattacked except for a slight eating away at the edges under prolonged etching, whereas the  $\gamma$  constituent with the same reagent is immediately tarnished and rapidly dissolved. The characteristic shape of the blue constituent is decidedly different from that of the  $\delta$  of the Cu-Sn alloys. For practical purposes in the study of the microstructure of Mn bronzes, it seems highly desirable to regard the blue constituent as distinct from either the  $\delta$  or  $\gamma$ , and it is suggested that it may reasonably be denoted as  $\delta'$ . In the manuf. of Mn bronze, the particles of  $\delta'$  are pptd. from the Cu-rich soln. by the addition of the Zn. This pptn. is strongly influenced by the presence of Fe and, therefore, the particles probably consist of a solid soln. of Fe and Cu with or without some Sn, Al, or Mn.

V. O. HOMERBERG

**The metallurgist and the brass foundry.** M. G. KORSUNSKY. *Metal Ind.* 20, 186-7(1922).—A criticism is made concerning modern technical schools in their relation to the metal industries.

V. O. HOMERBERG

**Physical properties of cartridge brass.** C. UPTHEGROVE AND W. G. HARBERT. *Trans. Am. Inst. Mining Met. Eng.* No. 1161-N, 10 pp. (1922).—For low-temp. anneals, following reduction by rolling, the Brinell hardness of cartridge brass is appreciably influenced by the anneal previous to the rolling. This influence decreases as the degree of reduction in rolling is increased. For low-temp. anneals following reduction by rolling, the tensile strength and elongation are influenced, though to a lesser degree than the Brinell hardness, by the anneal previous to the rolling. For cartridge brass annealed at temps. of  $650^{\circ}$ , or above, after reduction by rolling, the Brinell hardness, tensile strength, and elongation are independent of the anneal previous to the rolling.

V. O. HOMERBERG

**Dip-brazing with 80:20 brass and the heat-treatment of brazed joints.** E. V. SCHAAL. *Chem. Met. Eng.* 26, 1121-5(1922).—Preheating to dull redness just before brazing is desirable, but a higher temp. or continued heating should be avoided on account of oxidation of the surfaces to be brazed. It is advisable to coat the parts to be brazed with a paste made of borax and boric acid to prevent oxidation during preheating. Borax gives the best joints when brazing with 80:20 brass, but should be used in connection with a cooling flux, preferably boric acid, in order to prevent surface oxidation of the specimen. The proper brazing temp. is  $1850^{\circ}$  F. The best joints are obtained when the surfaces to be brazed are fastened close to each other by any suitable means without the use of shims or spacers. The strength in pure tension of joints made with C steel is approx. equal to the strength of the brass in tension. That of the Ni steel joints, heat-treated, is nearly twice the strength of the brass. The strength of joints in pure shear is approx. equal to the shearing strength of the brass. The shearing strength is also approx. equal to the tensile strength of the brass. Ni steel joints



tested in shear give approx. the same results as C steel joints tested in shear. Heat-treatment of brazed parts is shown to injure certain types of joints brazed with 80 : 20 brass. Metallographic study of brazed joints shows that low-C steel is not overheated by dip-brazing, and reveals an intermediate constituent between the brass and the steel which serves to hold the brass and steel together in the joint. V. O. HOMERBERG

A metallurgical investigation of solders. W. D. WILLIAMS. *Raw Materials* 5, 216-23(1922).—A review, chiefly of the work of Sterner-Rainer. R. H.

Arc welding of structural steel. E. S. HUMPHRYS, JR. *Iron Age* 109, 1422-6 (1922).—Tests made to det. reliability of welded joints and limiting conditions of various types of joints are considered. V. O. HOMERBERG

The cleaning and polishing of metals. MAURICE DE KEGHEL. *Rev. prod. chim.* 25, 327-33(1922).—A very brief discussion of the corrosion and tarnishing of metals, together with a large number of formulas for the prepn. of cleaning and polishing liquids, pastes, powders, and papers for the various metals (Cu, Ni, German silver, brass, Au, Ag, etc.). Processes for the cleaning of Au and Ag braids and bronze statues (exposed to the weather), and for the galvanic cleaning of Au and Ag objects are also briefly described. A. P.-C.

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Hydraulic setting properties of basic blast-furnace slags (KREBS) 20.

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Ore flotation. G. E. SHERIDAN and G. G. GRISWOLD. U. S. 1,421,585, July 4. Ore contg. sulfides of Pb and Fe is treated with cyanide and  $\text{Na}_2\text{CO}_3$  or  $\text{NaHCO}_3$  and then subjected to a flotation sepn. in which the PbS is recovered in the froth to effect selective sepn. from the Fe sulfide.

Ore flotation. R. LUCKENBACH. Can. 220,463, July 4, 1922. The grease tar product of the distn. of greasewood is added to ore pulp and the mixt. is aerated to form a froth. An alkali, alc. and acetone may also be used with the grease tar.

Ore-flotation apparatus. A. W. FAHRENWALD. U. S. 1,417,895, May 30. The ore pulp is maintained in continuous circulation while it is subjected to controlled aeration.

Ore-concentrator. R. LEROY. U. S. 1,421,264, June 27.

Blast-roasting apparatus for treating ores. G. RIGG. U. S. 1,421,989, July 4. The permeability of the charge treated is maintained by periodically breaking, perforating or opening up the clinker formed over a grate to permit uniform passage of the blast. Cf. C. A. 15, 2057.

Electrostatic separation of ore fines. G. R. BROWN. U. S. 1,422,026, July 4. Dried and hot ore fines or the like is centrifugally thrown against an electrode and is then passed between electrodes and selectively sepd. in accord with the degree of elec. charge previously imparted to the particles.

Smelting. W. E. TRENT. Can. 220,418, July 4, 1922. Finely divided ore and fuel are heated to render the particle adhesive and to distil the volatile products from the fuel. The viscous particles are then projected upon a collecting surface of the furnace to form a sintered mass and the fuel in the mass is burned to smelt the ore.

Furnaces for smelting. A. SMALLWOOD. Can. 220,410, July 4, 1922.

Collecting minerals suspended in water. W. E. TRENT. U. S. 1,421,862, July 4. Minerals such as fine ores or flue dust are mixed with fuel oil, crude oil or a similar hydrocarbon oil and comminuted coal or similar carbonaceous material and the mixt. is agitated with  $\text{H}_2\text{O}$  to obtain an agglomerate of the solid ingredients free from froth, which is then sepd.

Refining copper nickel mat. ROBT. L. PREX and N. V. HYBINKETTE. Can. 220,718, July 11, 1922. Disintegrated bessemerized Cu-Ni mat is roasted and leached with

H<sub>2</sub>SO<sub>4</sub> soln., the leached material is reduced and the Cu from the Cu-Ni soln. is cemented out on an excess of the reduced material at a temp. not substantially above normal. The cementation may be repeated on fresh portions of soln. The Ni is then sepd. by electrolysis. Cf. C. A. 15, 3444.

**Recovering sulfur dioxide from copper mat.** WM. H. HOWARD. Can. 220,432, July 4, 1922. Cu mat is heated in converters to produce white metal, portions of which are successively removed at regular intervals and heated for a predetd. time to maintain a continuous supply of gas having a relatively high percentage of SO<sub>2</sub>.

**Regenerative metal-working furnaces.** A. SMALLWOOD. Can. 220,411, July 4, 1922.

**Hearth furnace for melting malleable iron.** A. J. GRINDLE. U. S. 1,420,312, June 20. The furnace is heated by powdered solid fuel injected above the hearth.

**Furnaces for heating metal articles.** A. SMALLWOOD. Can. 220,409, July 4, 1922.

**Melting ferromanganese.** J. H. HALL and R. D. JORDAN. U. S. 1,421,218, June 27. A cupola is charged with successive layers of ferro-Mn and coke and with old clay brick bats to neutralize destructive oxidation products. The cupola is tapped at frequent intervals and the charge is correspondingly replenished.

**Deoxidizing aluminium and its alloys.** A. STRASSER. Can. 220,597, July 4, 1922. An Al cartridge contg. K<sub>3</sub>P is added to Al heated above its m. p. to convert the impurities into P compds. The temp. is raised and another cartridge contg. an alk. earth metal is added to oxidize the P compds., which burn at the expense of the alk. earth metal. The oxides, being insol. in Al, float.

**Open-hearth alloy steel.** J. McCONNELL. U. S. 1,420,328, June 20. Crushed alloying metal such as V, Zr or Ti and shot Al are admixed with the steel as it flows from a furnace to a ladle.

**Alloy steel.** C. M. JOHNSON. U. S. 1,420,707, June 27. A steel alloy adapted for making cutlery or machine parts is prepd. with a content of Cr 10-20%, Ni 9-25% and Si 1-10%.

**Alloy steel.** C. M. JOHNSON. U. S. 1,420,708, June 27. An alloy steel which has a high elec. resistance is formed with a content of Cr 6-18, Ni 12-36, Si 1-10 and Fe 50% or more (the Ni being present in at least about twice the amt. of the Cr).

**Alloy.** B. M. HUFF. Can. 220,804, July 11, 1922. An alloy contains W 9.84, Cr 25.83, Co 51.78, MnO<sub>2</sub> 1.51, SiO<sub>2</sub> 5.64 and malleable Fe 5.4%.

**Zinc alloy.** H. GOLDSCHMIDT and K. MÜLLER. U. S. 1,421,686, July 4. An alloy adapted for many of the same uses as Cu or brass is formed of Zn together with 0.5-4% Mn and 0.25-2% Al.

**Metal-scavenging alloy.** D. H. McLEAN. Can. 220,859, July 11, 1922. An alloy contg. U and Al to which Mg may be added is useful as a scavenger in treating metal.

**Metallic powder adapted for use in acid-resisting mixtures.** W. P. HASKETT. U. S. 1,421,471, July 4. Metallic substances such as a compn. of Mn 40, Fe 10, Cu 10, Al 10, Sn 5, Zn 15 and Pb 10 parts form a self-disintegrating compn. for use as a pigment or in acid-resisting cement mixts. Sb, Bi and Si may replace Pb, Sn and Cu, resp.

**Apparatus for tempering and annealing.** D. S. LAVAUD, B. F. CLARK and C. W. BAINES. U. S. 1,420,379, June 20. The app. comprizes a heating chamber and a cooling chamber in which a steam generator is placed to utilize the heat given off from the articles within the cooling chamber.

**Receptacle for holding steel sheets or other articles during annealing.** H. H. GOODSILL. U. S. 1,421,212, June 27.

**Coating molds for casting metals.** A. D. STRAW. U. S. 1,420,888, June 27.

A stream of metallic vapor such as Zn is directed on the surface of the mold in the presence of O to form an oxide coating on the mold. The latter may be formed of Fe if used for casting ferrous metal and pitting of the mold is prevented.

## 10—ORGANIC CHEMISTRY

CHAS. A. ROULLIER

**Recent advances in science—Organic chemistry.** O. L. BRADY. *Science Progress* 16, 541-7(1922).—Review of recent work on *organo-metallic compds.* of Cr, Pb, Bi, and Hg, and on the *oxidation products of oximes.* JOSEPH S. HERBURN

**Progress in organic chemistry.** ERICH BENARY. *Fortschritte Chem.* 16, 31-59 (1920).—From Oct. 1918 to Apr. 1920. C. C. DAVIS

**Some new methods in the domain of organic chemistry.** J. v. BRAUN. *Z. angew. Chem.* 35, 2-5(1922).—A review. The "new methods" are: microanalysis, microdetn. of mol. wts., absorption spectra in the ultra-violet and infra-red regions, study of the mol. structure of complex compds. (as cellulose) by the use of X-rays, photosynthesis, direct hydrogenation and dehydration in the gaseous phase, and biosynthesis.

DONALD W. MACARDLE

**The oxidation of organic salts by gaseous oxygen.** (Preliminary communication.) S. T. VLES. *Chem. Weekblad* 19, 260-1(1922).—The oxidation of nitrites is exclusively due to the oxidation of  $\text{HNO}_2$  set free, *e. g.*, by the  $\text{CO}_2$  of the air. In sulfites, however, the ion  $\text{SO}_3^-$  is oxidized. The specific influence of org. compds. on the oxidation will be studied. R. BRUTNER

**Steric structural formulas of chemical compounds in general.** H. G. DERX. *Chem. Weekblad* 19, 189-90(1922).—D. criticizes the structural theory put forward by Zwicker (*C. A.* 16, 2149) on the ground of lack of exptl. evidence. According to the complicated geometrical structures devised by Z. it should be possible, *e. g.*, to split the quinoline ring into optical antipodes, which is not the case. R. BRUTNER

**Steric formulas.** J. J. LUYNSR ZWICKER. *Chem. Weekblad* 19, 258-9(1922).—Z. replies to the objections of Derx (*cf.* previous abstr.). He insists that steric structural formulas must be used for complicated compds., not formulas extending in one plane only. R. BRUTNER

**Conversion of allyl alcohol to glyceryl chloro- and bromohydrins.** JOHN READ AND ERIC HURST. *J. Chem. Soc.* 121, 989-99(1922).—The successful results attending the use of  $\text{Cl-H}_2\text{O}$  and  $\text{Br-H}_2\text{O}$  in the prepn. of halohydrins from unsatd. substances (*C. A.* 11, 1952; 14, 2841; 15, 57) led to the application of these reagents to  $\text{CH}_2\text{:CH-CH}_2\text{OH}$ . This gives a mixt. of the  $\beta$ -mono- and dihalohydrins. For the prepn. of the  $\beta$ -dihalogen deriv., the action of the halogen on  $\text{CH}_2\text{:CHCH}_2\text{OH}$  in  $\text{CS}_2$  is recommended. The reaction of Br vapors (air satd. with Br) upon  $\text{CH}_2\text{:CHCH}_2\text{OH}$  in  $\text{H}_2\text{O}$  at  $0-3.5^\circ$  until the concn. of  $\text{HOCH}_2\text{CHBrCH}_2\text{OH}$  (A) reaches 1 to 1.25 N (as detd. by titration) gives about 60% of the theoretical yield. Its isolation is difficult because it apparently decomps. upon distn. under pressure. 510 g. oil (isolated by satn. of the aq. soln. with  $\text{Na}_2\text{SO}_4$  at  $30^\circ$  and extg. 3 times with  $\text{Et}_2\text{O}$ ), contg. 56% A and 44%  $\text{BrCH}_2\text{CHBrCH}_2\text{OH}$  (B), gave, upon fractional distn. at 20 mm., 55 g. A (20%), *b<sub>p</sub>*  $136-8^\circ$ , *d<sub>4</sub><sup>20</sup>* 1.7858 (vacuum); its vapor has an irritant action similar to that of  $\text{BrCH}_2\text{CH}_2\text{OH}$ . The yield of B can be practically doubled by using a soln. of  $\text{CH}_2\text{:CHCH}_2\text{OH}$  in its own wt. of  $\text{H}_2\text{O}$ ; it *b<sub>p</sub>*  $111-4^\circ$ , *d<sub>4</sub><sup>20</sup>* 2.1197; it is miscible with  $\text{C}_6\text{H}_6$ , while A is only partly miscible. In the reaction of Cl upon  $\text{CH}_2\text{:CHCH}_2\text{OH}$  in  $\text{H}_2\text{O}$ ,  $\text{HOCH}_2\text{CHClCH}_2\text{OH}$  (C) and  $\text{ClCH}_2\text{CHClCH}_2\text{OH}$  (D) are formed, but the yields are low and their sepn. in a state of purity is difficult. This is probably due to the vigor of the reaction and the formation of other products. The yield of C is 10.8%, of D, 11.2% (based on

the alc. used). C possesses a marked irritating odor,  $b_{13.4}$  122.5–3.5°,  $d_4^{20}$  1.3416,  $d_4^{30}$  1.3241 (vacuum). Neither A nor C is completely miscible with  $H_2O$ . D  $b_{13.4}$  81–1.5°,  $d_4^{20}$  1.3745,  $d_4^{30}$  1.3534, and is completely miscible with EtOH, Et<sub>2</sub>O, AcMe and  $C_6H_6$ .

C. J. WARR

**The action of acetylene on the sodium ketones and the preparation of the dialkyl ethynylcarbinols.** R. LOCQUIN AND SUNG WOUSSENG. *Compt. rend.* 174, 1427–9 (1922).—Na derivs. of several ketones were prepd. in Et<sub>2</sub>O or PhH and treated in a closed flask with  $C_2H_2$  gas at 0° and 0.5 kg./cm.<sup>2</sup> with violent agitation. The gas is absorbed at a rate of 1 l. per hr. per g.-mol. When the absorption is complete the solns. are washed with ice- $H_2O$  and the acetylenic tertiary alcs. purified by fractional distn. These are mobile liquids, esterifiable, forming characteristic phenylurethans and allophanates; they form Ag derivs. stable in boiling  $H_2O$ .  $H_2$  with Pt black or Ni black gives the corresponding satd. alcs., identical with those formed by the action of Et-MgBr on the original ketones. If any of the original ketone is present in the soln. it will condense with the alcohol, forming bitertiary acetylenic  $\gamma$ -glycols,  $RR'C(OH)C:CC(OH)RR'$ , which generally exist in two stereoisomeric forms, *a* and *b*; they are identical with those obtained by condensing  $C_2Br_2$  with the original ketone. The compds. thus obtained follow: From Me isohexyl ketone: *Methylisohexylethynylcarbinol*  $b_{10}$  83–5°, *b*. 187–8°; its allophanate m. 114–5°. *Methylethylisohexylcarbinol*  $b_{10}$  92–3°; its allophanate m. 110–1°; the  $\gamma$ -glycols  $b_{12}$  183–4°, m. 66–8° (*a*) and 35° (*b*). From Me nonyl ketone: *Methylnonylethynylcarbinol*  $b_{11}$  127–8°; its allophanate is pasty; *methylethynonylcarbinol*  $b_{11}$  131–4°;  $\gamma$ -glycols  $b_{13}$  237–8°, m. 91–2° (*a*) and 70–1° (*b*). From  $Pr_2CO$ : *Dipropylethynylcarbinol*  $b_{13}$  69–71°, d. 0.8691; its allophanate m. 143°; *dipropylethylcarbinol*  $b_{10}$  78–9°; its allophanate m. 124°; the  $\gamma$ -glycols  $b_{13}$  118–9°. From  $Me_2CCOMe$ : *Methyl-tert-butylethynylcarbinol* *b*. 142–4°, d. 0.8896; its allophanate m. 156°; *methyl-tert-butylethylcarbinol* *b*. 152°; allophanate m. 134–5°;  $\gamma$ -glycols  $b_{14}$  148–50°, m. 88–9° (*a*) and 78° (*b*).

T. E. DUNLAP

**The preparation of dialkylvinylcarbinols.** R. LOCQUIN AND SUNG WOUSSENG. *Compt. rend.* 174, 1551–3 (1922).—The reactive acetylenic compds. of the type  $RR'C(OH)C:CH$  (preceding abstr.) have been hydrogenated to the corresponding ethylenic compds. by Ruzicka and Fornisir (*C. A.* 13, 1074) and further work along this line has been carried out by L. and W. The employment of Pt and Pd as catalysts in alc. soln. resulted in cleavage of the mol. and regeneration of the original ketone. Ni (10% of the wt. of the compd. to be reduced) when used according to the procedure of Brochet (*C. A.* 8, 3180) in MeOH gave the best results. The absorption was rapid (10 l.  $H_2$  per 0.5 mol. per hr.) and much heat was evolved. When the calcd. vol. of gas was absorbed the expt. was stopped, the mixt. was filtered, the solvent evapd., the residue agitated with 20%  $AgNO_3$  to remove any residual acetylenic compd., the residue was steam-distd. and a 70–75% yield of the desired compd. was obtained. The tertiary ethylenic alcs. are mobile liquids, never pure when prepd. by this method owing to the presence of a small amt. of the satd. alc. They retain  $H_2O$ , forming more or less stable hydrates. They are dried best by distn. over Na or solid KOH. They exhibit all the properties of ethylenic compds., are readily dehydrated, forming hydrocarbons. They do not esterify but form cryst. allophanates which are hard to purify because of the presence of satd. compds. *Methylisohexylvinylcarbinol*,  $b_{15}$  89–91°; *dipropylvinylcarbinol*,  $b_{13}$  75–6°, the allophanate m. 112°; *methylpseudobutylvinylcarbinol* *b*. 146–7°,  $d_4^{11}$  0.8576,  $n_D^{11}$  1.4432; the allophanate m. 167–8°.

H. E. W.

**Chlorinated dialkyl sulfides.** WM. J. POPE AND J. L. B. SMITH. *J. Chem. Soc.* 121, 1166–70 (1922); cf. *C. A.* 15, 2061.—It is now shown that "amylenes" react with  $S_2Cl_2$  at temps. below 20° to form disulfides, in which the grouping—S.S—is probably present since no trace of free S appears during mild oxidation.  $\beta,\beta'$ -Dichloro- $\alpha,\alpha'$ -dimethyl-

*diisobutyl disulfide*, prepd. by dropping  $\text{Me}_2\text{CHCH}:\text{CH}_2$  into  $\text{S}_2\text{Cl}_2$  at  $-10^\circ$ , light red oil,  $b_D$  150–60°. It has no appreciable vesicant action on the skin but its vapor causes inflammation of the mucous membrane. Dil.  $\text{HNO}_3$  attacks the sulfide with great violence in the cold but no pure products were isolated. Boiled with alc. KI, HI and I are liberated; poured into  $\text{NaHSO}_3$  and extd. with  $\text{Et}_2\text{O}$ ,  $\alpha,\alpha'$ -dimethyldiisobutyl disulfide is obtained, pale yellow oil. With  $\text{PhONa}$ , the  $\beta,\beta'$ -diphenoxy derivative is formed, which could not be distd. or crystd. The same disulfide was obtained from  $\text{MeCH}:\text{CMe}_2$ . The action of styrene and  $\text{S}_2\text{Cl}_2$  gives  $\beta,\beta'$ -dichloro- $\beta,\beta'$ -diphenyldiethyl sulfide, which decomps. at  $200^\circ$  (1 mm. pressure); it has no vesicant action. With alc.  $\beta\text{-C}_{10}\text{H}_7\text{ONa}$  it yields *distyryl sulfide*, pale yellow oil.  $\text{CH}_2:\text{CHCH}_2\text{Cl}$  and  $\text{S}_2\text{Cl}_2$  heated in a sealed tube at  $100^\circ$  for 6 hrs., gave  $\beta,\beta',\gamma,\gamma'$ -tetrachlorodispropyl sulfide, pale yellow oil,  $b_D$  181–2°. On prolonged boiling with 50%  $\text{HNO}_3$ , and removing  $\text{H}_2\text{SO}_4$  with  $\text{Ba}(\text{OH})_2$ , barium  $\beta,\gamma$ -dichloropropanesulfonate is obtained; ammonium salt, needles. At the ordinary temp., the disulfide is obtained, light yellow oil,  $b_D$  190°. With  $\text{HNO}_3$  it gives the above acid.

C. J. WEST

The chlorohydrin of mesityl oxide and its transformation into tetramethylglycerol. PASTUREAU AND HENRI BERNARD. *Compt. rend.* 174, 1555–7 (1922).—The chlorohydrin (B) of mesityl oxide (A) was prepd. by treating 100 g. A with  $\text{HOCl}$  obtained by treating 150 g.  $\text{H}_2\text{BO}_3$  with 300 g.  $\text{CaOCl}_2$  in  $\text{H}_2\text{O}$  (Baeyer, Lauch, Bamberger). After standing 12–15 hrs. the mixt. was extd. with  $\text{Et}_2\text{O}$ , the layer washed, dried with  $\text{Na}_2\text{SO}_4$ , the  $\text{Et}_2\text{O}$  recovered, and on distn. *in vacuo* 50 g. B,  $b_D$  81°, were obtained, colorless oily liquid, with an odor of camphor and becoming violet in the light. 50 g. B with the  $\text{MgMeI}$  from 16 g. Mg interacted readily, yielding a product from which was obtained tetramethylglycerolchlorohydrin, viscous liquid, turning brown in the light, crystals, m.  $60^\circ$ , sol. in  $\text{H}_2\text{O}$ , alc. and  $\text{Et}_2\text{O}$ . The general reaction would yield chlorohydrins of the type  $\text{Me}_2\text{C}(\text{OH})\text{CHClCMeOH}$ , from which the corresponding glycerols could be obtained.

H. E. W.

The oxidation of potassium acetate to potassium oxalate. W. L. EVANS AND P. R. HINES. *J. Am. Chem. Soc.* 44, 1543–6 (1922).— $\text{KOAc}$  may be oxidized to  $(\text{CO}_2\text{K})_2$  with alk.  $\text{KMnO}_4$  under certain definite conditions, the yield of  $(\text{CO}_2\text{H})_2$  being a function of the concn. of the reagents, the temp. and the duration of the expt. Thus, 9.3144 g.  $\text{KOAc}$  in 1 l.  $\text{H}_2\text{O}$  with 30 g.  $\text{KMnO}_4$  gave after 384 hrs. at  $50^\circ$  ams. of  $(\text{CO}_2\text{H})_2$  ranging from 0.517 g. in the presence of 14.62 g.  $\text{KOH}$  to 1.021 g. with 170.3 g.  $\text{KOH}$ , and after 72 hrs. at  $75^\circ$ , from 0.770 g. with no  $\text{KOH}$  to 1.662 g. with 169.8 g.  $\text{KOH}$ .

C. A. R.

Bromination of acids in the  $\alpha$ -position. C. F. WARD. *J. Chem. Soc.* 121, 1161–5 (1922).—The best conditions for the prepn. of  $\text{BrCH}_2\text{CO}_2\text{H}$  are the action of 20 g.  $\text{AcOH}$  and 58 g. Br in the presence of 0.4 g. red P, at  $100\text{--}5^\circ$ ; the yield is about 80%. From this and the satisfactory yield obtained by the action of Br upon dry  $\text{AcOH}$  after preliminary treatment with  $\text{HBr}$  (treatment with  $\text{AcBr}$ ) it is concluded that P does not act as a carrier but forms  $\text{PBr}_3$ , which, in the presence of moisture, forms  $\text{HBr}$  and causes the enol formation (Aschan, *C. A.* 6, 2755). Unless the acid is quite free from  $\text{H}_2\text{O}$ , the use of a considerable amt. of red P is a positive disadvantage, and leads to loss of Br. In 1 expt.,  $\text{AcOH}$  was satd. with  $\text{HBr}$  and treated with Br, with the formation of the compd. described by Hell (*Ber.* 11, 244),  $(\text{C}_2\text{H}_3\text{O}_2\text{Br})_4\cdot\text{HBr}$ , bright red needles, m.  $35\text{--}40^\circ$ ; upon heating this compd. into Br and  $\text{AcOH}$ . Good yields of  $\text{MeCHBrCO}_2\text{H}$  were also obtained by the above method. Br does not react with camphoric acid in  $\text{CCl}_4$  (0.1 g. red P per 5 g. acid) but a 75% yield of the Br compd. was obtained by heating at  $125^\circ$  in  $\text{C}_2\text{HCl}_3$ ; at the b. p. of the mixt., considerable charring occurred with a corresponding low yield of Br deriv.

C. J. WEST

Preparation of aldehydes from acid chlorides. V. K. W. ROSENEMUND AND F. ZETZSCHE. Dialdehydes. II. Synthesis of decanedial. *FR. ZETZSCHE AND FL.*

ENDERLIN. *Ber.* 55B, 609-12(1922); cf. C. A. 16, 1411.—Sebacyl dichloride (A),  $b_D^{20}$  162°, can be obtained in 90-5% yield if the  $\text{POCl}_3$  is removed from the product of the reaction between the acid and  $\text{PCl}_5$  in *vacuo* instead of at room temp. and if the distn. of the A is made as rapid as possible by keeping the bath temp. high (205°). From 12 g. of A in 40 cc. xylene with 1 mg. of the S-quinoline regulator and 1 g. of 2.5% Pd-kieselguhr catalyzer vigorously turbinized with H at 150° for about 5 hrs. is obtained about 80% of decanedial (sebacyl dialdehyde) (B), light yellow oil  $b_D^{20}$  142° (with some polymerization, so that only 30-40% can be distd. over), quickly solidifies to a glassy mass if not taken up in a solvent or fractionated at once; the distillate likewise changes in about 1 hr. to the hard gum-like glassy modification which is insol. in the ordinary solvents; both forms give the typical aldehyde reactions with Fehling soln., fuchsin- $\text{SO}_2$  and  $\text{NH}_4\text{-AgNO}_3$ , the liquid form reacting instantly, the glassy form more slowly. The liquid form is moderately volatile with steam; boiling dil.  $\text{H}_2\text{SO}_4$  slowly depolymerizes the glassy form. B has a pleasant flower-like, the hot vapor a penetrating odor; the glassy form darkens superficially on standing. Bisulfite compound, finely cryst. powder. Barium sebacyldialdehydedinaphthyl-1-imide-4-sulfonate,  $\text{C}_{26}\text{H}_{18}(\text{CH}:\text{N}:\text{C}_{10}\text{H}_7\text{SO}_3)_2\text{Ba}$ , obtained in 73% yield from the reduced soln. of A shaken with Ba naphthionate, light yellow microcryst. powder, insol. in all ordinary indifferent solvents, hydrolyzed to the dialdehyde by boiling mineral acids. 1,10-Bishydroximinodecane (sebacyl dialdoxime), from the  $\text{NaHSO}_3$  compd.,  $\text{NH}_4\text{OH}:\text{HCl}$ ,  $\text{NaOAc}$  and  $\text{AcOH}$  in hot  $\text{H}_2\text{O}$ , fine needles from 70%  $\text{MeOH}$ , m. 124-7° (the product obtained by v. Braun and Sobocki by reduction of 1,10-dinitrodecane (C. A. 5, 3821) m. 137-41° and is perhaps a stereoisomer). Bis-p-nitrophenylhydrazones, fine brick-red crystals from 70% alc., m. 104-7° (decompn.). Diphenylhydrazones, light yellow oil. C. A. R.

**Diglycolic acid or anhydroglycolic acid.** RICHARD ANSCHÜTZ AND SIEGFRIED JAEGER. *Ber.* 55B, 670-9(1922).—According to his bibliography, Sido (C. A. 16, 899) does not know of A.'s two papers (*Ann.* 259, 187(1890); 273, 64(1892)), in which, among other compds., are described "diglycolic anhydride" (A) and "diglycolic anil." The following diglycol- or anhydroglycolarylamidic acids,  $\text{RNHCOCH}_2\text{OCH}_2\text{CO}_2\text{H}$ , were prepd. from equimol. amts. of A and amines in  $\text{CHCl}_3$ , either allowed to stand at room temp. or refluxed a long time: *o*-Toluididic, fine needles from  $\text{H}_2\text{O}$ , m. 120°; *m*-isomer, fine needles from  $\text{H}_2\text{O}$  or  $\text{CHCl}_3$ , m. 131-2°; *p*-compound, leaflets from  $\text{CHCl}_3$ , long needles from  $\text{H}_2\text{O}$ , m. 148°; *p*-xylylidic, flat table-shaped crystals from  $\text{H}_2\text{O}$ , m. 106°; *asym-m*-isomer, fine needles from  $\text{H}_2\text{O}$ , m. 116-7°; 1,2,4,5-pseudocumididic, fine needles from  $\text{H}_2\text{O}$ , m. 133-5°;  $\alpha$ -naphthylidic, fine needles from  $\text{H}_2\text{O}$ , m. 165°;  $\beta$ -isomer, microneedles. They dissolve in boiling  $\text{AcCl}$  with evolution of  $\text{HCl}$  and on distn. of the excess of  $\text{Ac}_2\text{O}$  and of the  $\text{AcOH}$  formed yield the following diglycol- or anhydroglycolarylimides,  $\text{O}(\text{CH}_2\text{CO})_2\text{NR}$ : Anil, m. 195° (erroneously given as 111° in the earlier papers); *o*-tolil, needles from alc., m. 126°; *m*-isomer, fine microneedles from  $\text{H}_2\text{O}$ , m. 114°; *p*-compound, felted needles from alc., m. 180°; *p*-xylylidil, flat 6-sided tables from 50%  $\text{Me}_2\text{CO}$ , m. 127°; *asym-m*-xylylidil, needles from alc., m. 102°;  $\alpha$ -naphthil, fine columns from 50%  $\text{AcOH}$ , m. 176°;  $\beta$ -naphthil, fine quadrangular columns from alc., m. 172.5°. Hydrazonium diglycolhydrazidate, from A and 2 mols. anhyd.  $\text{N}_2\text{H}_4$  in  $\text{CHCl}_3$ , crystals deliquescent in the air; free acid, fine needles from  $\text{H}_2\text{O}$ , m. 113-4°; silver salt, leaves soon darkening in diffuse daylight when moist but less sensitive to light when quickly drained and dried.  $\text{O}(\text{CH}_2\text{CO}_2\text{Me})_2$ , m. 36°,  $b_D^{20}$  130° (cf. the earlier papers), can also be prepd. by satg. A in excess of  $\text{MeOH}$  with  $\text{HCl}$ . Diglycolmethylidic acid,  $\text{MeO}_2\text{CCH}_2\text{OCH}_2\text{CO}_2\text{H}$  (like the "amidic" acids, it is proposed to call the acid esters "methylidic, ethylidic" acids, etc.), obtained in 9.5 g. yield from 10 g. A and 1 mol.  $\text{MeOH}$ , viscous liquid,  $b_D^{20}$  about 170°, solidifies in a freezing mixt.; 15.5 g. refluxed 3-4 hrs. with 40 g.  $\text{SOCl}_2$  gives 14.5 g. of the chloride,  $\text{MeO}_2\text{CCH}_2\text{-}$

$\text{OCH}_2\text{COCl}$ , mobile liquid of penetrating odor,  $b_{11}$  107-8°,  $b_{12}$  114-5°, yielding with 2 mols.  $\text{PhNH}_2$  in  $\text{CHCl}_3$  the *anilide*,  $b$  175-80°, light yellow oil; *o-toluidide*, yellow oil,  $b_{11}$  185°, solidifies at room temp.; *p-isomer*, fine needles from  $\text{MeOH}$ ,  $m$  41°; *acid cyanide*,  $\text{MeO}_2\text{CCH}_2\text{OCH}_2\text{COCN}$ , obtained in small yield from the chloride and finely divided  $\text{AgCN}$  (dried at 100°) heated several hrs. at 160-70° after the first violent reaction has ceased, heavy liquid with the odor of  $\text{HCN}$ ,  $b_{11}$  165-70°; treated with the amt. of  $\text{HCl}$  (d. 1.2) corresponding to 1 mol.  $\text{H}_2\text{O}$  it yields  $\text{NH}_4\text{Cl}$  and a small amt. of needles,  $m$  138°, contg. N, probably the expected *amide*, while when allowed to stand several days with an equal wt. of  $\text{HCl}$  (d. 1.2) evapd. to dryness and extd. with  $\text{Et}_2\text{O}$  it gives *anhydrohydroxyacetichydroxypyruvic acid*,  $\text{HO}_2\text{CCH}_2\text{OCH}_2\text{COCO}_2\text{H}$ ,  $b_{11}$  160°,  $m$  129-30°; *disilver salt*, amorphous, quickly darkens in the light when moist.

C. A. R.

**$\beta$ -Halogen-substituted fatty acids and  $\beta$ -lactones.** HJALMAR JOHANSSON AND S. M. HAGMAN. *Ber.* 55B, 647-58 (1922).—From Erlenmeyer's time (*Ber.* 13, 305 (1880)) it has been generally accepted that the decompn. of  $\beta$ -halogen-substituted acids by soda into Na halides,  $\text{CO}_2$  and olefins occurs through  $\beta$ -lactones assumed to be unstable. Although a considerable no. of such lactones have since been isolated their existence has been considered as being rather in the nature of exceptional cases. J. however, was led to believe (*Diss. Lund* 1916) that this class of substances is far larger than had up to that time been assumed and that their formation from  $\beta$ -halogen-substituted acids occurs as frequently as that of  $\gamma$ -lactones from the  $\gamma$ -acids, the chief difference in the conditions necessary for the isolation of the 2 types of lactones being that whereas the  $\gamma$ -lactones can be reformed, after their hydrolysis, from the HO acids, the hydrolysis of the  $\beta$ -lactones is not reversible and must therefore be avoided. He concluded, also, from his work that the direct formation of unsatd. hydrocarbons and of lactones from the  $\beta$ -halogen-substituted acids are simultaneous reactions. In the present paper he describes 2 new  $\beta$ -lactones,  $\alpha$ -methyl- (A) and  $\alpha$ -ethyl- $\beta$ -butyrolactone (B).  $\text{MeCHBrCHMeCO}_2\text{H}$  (C) is obtained in 88% yield from 40 g. tiglic acid in 220 cc. of colorless 47%  $\text{HBr}$  in ice-salt satd. with Br-free  $\text{HBr}$ , allowed to stand 3 days at room temp., again satd. cold with  $\text{HBr}$  and allowed to stand 3 days, poured upon 185 g. ice, filtered, taken up in  $\text{CCl}_4$  (with which the soln. is also extd.) and concd.; crystd. from petr. ether it  $m$  63-4°. The soln. of the Na salt decompd. in great part (about  $\frac{2}{3}$ ) according to the equation  $\text{MeCHBrCHMeCO}_2^- = \text{MeCH:CHMe} + \text{CO}_2 + \text{Br}^-$ , and the rest chiefly according to the equation  $\text{MeCHBrCHMeCO}_2^- = \text{A} + \text{Br}^-$ ; possibly there is also formed a small amt. (a few %, at most) of an unsatd. acid or complex reaction products. Both reactions are monomol.; the combined reactions can be followed well by detg. the Br-ion concn. argentometrically and the 1st reaction by detg. the  $\text{CO}_2$  evolved; results which were quite const. and agreed well for different series were obtained; the mean value of  $k_1 + k_2$  (time in min.) was found to be 0.0113 and those of  $k_1$  and  $k_2$  0.0075 and 0.0038, resp. Similarly,  $\text{MeCHBrCHEtCO}_2\text{H}$  (D) is obtained in 78% yield from the liquid mixt. of the 2 stereoisomeric  $\text{MeCH:CEtCO}_2\text{H}$  obtained by distg.  $\text{Et}_2\text{C(OH)CO}_2\text{H}$ ; it seps. from petr. ether in faintly yellowish crystals  $m$  25°. Its Na salt decomp. like that of C,  $k_1$  and  $k_2$  being 0.0104 and 0.0060. A and B are best isolated by turbinng the acid, neutralized in  $\text{H}_2\text{O}$  with  $\text{Na}_2\text{CO}_3$ , with  $\text{CHCl}_3$ , distg. off the latter and distg. the residue *in vacuo*. To obtain the best yields and a pure product acid by-products should be neutralized from time to time during the reaction with a small crystal of  $\text{Na}_2\text{CO}_3$ , the  $\text{CHCl}_3$  renewed a couple of times and the exts. washed with a few cc. of dil.  $\text{Na}_2\text{CO}_3$  and dried thoroughly with  $\text{CaCl}_2$  before distg. The hydrolysis of A and B is essentially the same as that of other  $\beta$ -lactones already studied, but the deviation from a pure monomol. reaction is so considerable and the H ion catalysis so noticeable that an investigation of the side reactions

producing these deviations seems promising; it has been observed that addition of the reaction products (the HO acids) slows the hydrolysis and an apparently const. velocity coeff. of the 1st order is obtained; at the same time, especially towards the end of the reaction, there is an evolution of  $\text{CO}_2$  accompanied by a distinct odor of illuminating gas. A (4 g. from 25 g. C at either  $30^\circ$  or  $40^\circ$ ),  $b_{21}$   $67-7.5^\circ$ , is a mobile strongly refractive liquid of peculiar, not unpleasant odor, solidifies about  $-30^\circ$ , m. about  $-24^\circ$ ,  $d_{20}$  0.9862, mol. wt. in boiling  $\text{Et}_2\text{O}$  101.7–112.2. B (5.96 g. from 32.1 g. D),  $b_{18}$   $79-81^\circ$ , does not completely solidify  $-50^\circ$ , m. completely  $-25^\circ$ ,  $d_{20}$  0.9700, mol. wt. in boiling  $\text{Et}_2\text{O}$  111.8–6.8; 100 cc. of the satd. aq. soln. at room temp. contains 2.46 g. B.

C. A. R.

**Halogenation.** XXI. Some derivatives of carbamic esters. Chlorine as a simultaneous oxidizing and condensing agent. R. L. DATTA AND B. C. CHATTERJEE. *J. Am. Chem. Soc.* **44**, 1538–43 (1922); cf. C. A. 15, 1524.—When Cl is passed into carbamic esters in alc., the alc. is oxidized to the aldehyde, which immediately condenses with 2 mols. of the carbamic ester to a dicarbamic ester. With urethan in  $\text{EtOH}$ , the  $\text{EtOH}$  is both chlorinated and oxidized and the product is  $\text{CHCl}_2\text{CH}(\text{NHCO}_2\text{Et})_2$  (A). With aromatic urethans, the aromatic radicals are also chlorinated. Sec. alcs. do not condense in this way.  $\text{CH}_3(\text{NHCO}_2\text{Et})_2$ , from  $\text{H}_2\text{NCO}_2\text{Et}$  in  $\text{MeOH}$  and Cl, silky needles from dil. alc., m.  $131^\circ$ .  $\text{CH}_3(\text{NHCO}_2\text{Me})_2$ , from  $\text{H}_2\text{NCO}_2\text{Me}$ , needles from  $\text{Et}_2\text{O}$ , m.  $124^\circ$ . *Dipropyl methylenedicarbamate*, silky needles from dil. alc., m.  $113^\circ$ . *Diisobutyl ester*, needles from dil. alc., m.  $115^\circ$ . *Isoamyl ester*, cryst. powder from dil. alc., m.  $80^\circ$ .  $\text{PhCH}(\text{NHCO}_2\text{Et})_2$ , from  $\text{H}_2\text{NCO}_2\text{Et}$  in  $\text{PhCH}_2\text{OH}$ , silky needles from dil. alc., m.  $175^\circ$ . A, from  $\text{H}_2\text{NCO}_2\text{Et}$  in  $\text{EtOH}$ , needles from dil. alc., m.  $122^\circ$ . *Methylenedi-p-chlorophenyldiurethan*,  $\text{CH}_2[\text{N}(\text{C}_6\text{H}_4\text{Cl})\text{CO}_2\text{Et}]_2$ , from  $\text{PhNHCO}_2\text{Et}$  in  $\text{MeOH}$ , needles from alc., m.  $87^\circ$ . *Methylenedinitrarchloro- $\alpha$ -naphthyldiurethan*,  $\text{CH}_2[\text{N}(\text{C}_{10}\text{H}_7\text{Cl}_2)\text{CO}_2\text{Et}]_2$ , from  $\alpha\text{-C}_{10}\text{H}_7\text{NHCO}_2\text{Et}$  in  $\text{MeOH}$ , needles from alc., m.  $160-1^\circ$ .  $\text{CINHCO}_2\text{Et}$  kept under  $\text{H}_2\text{O}$  about 8–10 days yields *diethyl 4-chloromethylcyclohexylmethylenediazineimide-1,3-dicarboxylate*,  $\text{CICH}_2\text{CH}_2\text{N}(\text{CO}_2\text{Et})_2$  (probably

formed by condensation of 2 mols. of the urethan with  $\text{NH}_3$  and with  $\text{CICH}_2\text{CHO}$  resulting from hydrolytic oxidation of the urethan), needles from  $\text{H}_2\text{O}$ , m.  $143-4^\circ$ , identical with a product obtained by adding  $\text{CINHCO}_2\text{Et}$  to  $\text{EtOH}$ ; refluxed with  $\text{Ac}_2\text{O}$  and a few drops of  $\text{C}_6\text{H}_5\text{N}$  it yields an *acetyl derivative*, granular crystals from  $\text{C}_6\text{H}_6$ , m.  $117-8^\circ$ , and with Cl in hot  $\text{H}_2\text{O}$  the *imide chloride*, m.  $75-6^\circ$ , slowly decomp. with evolution of Cl. *Methyl dichlorocarbamate* is obtained nearly quant. as an oil by treating  $\text{H}_2\text{NCO}_2\text{Me}$  in  $\text{H}_2\text{O}$  with Cl.

C. A. R.

**Isopropyl-, menthyl- and bornylsemicarbazides.** Reduction of phenylhydrazones. DEWITT NEIGHBORS, A. L. FOSTER, S. M. CLARK, J. E. MILLER AND J. R. BAILEY. *J. Am. Chem. Soc.* **44**, 1557–64 (1922); cf. C. A. 16, 904.—Catalytic reduction by the Skita method makes it possible to effect the reduction of certain semicarbazones and phenylhydrazones with which other investigators, using different methods, obtained only negative results. Thus,  $\text{Me}_2\text{C}:\text{NNHCONH}_2$  gives, besides a little  $\text{Me}_2\text{CHNH}_2$ , about 70% of *isopropylsemicarbazide* (A), plates from  $\text{AcOEt}$ , m.  $128^\circ$ ; *hydrochloride*, short thick prisms from 95% alc., m.  $186.5^\circ$ ; *oxalate*, prisms from  $\text{H}_2\text{O}$ , m.  $172^\circ$ ; *nitroso derivative*, short, light yellow prisms from  $\text{AcOEt}$ , decomp.  $128^\circ$ , gives the Liebermann reaction, evolves in boiling  $\text{H}_2\text{O}$  a vapor alk. to turmeric, probably as the result of hydrolysis to  $\text{Me}_2\text{CHNH}_2 + \text{N}_2\text{O} + \text{NH}_3 + \text{CO}_2$ ; heated on the  $\text{H}_2\text{O}$  bath with 80%  $\text{H}_2\text{SO}_4$  until the evolution of  $\text{CO}_2$  ceases, it gives *isopropylhydrazine* as an oil identified by conversion into the *dibenzoyl derivative*, radiating needles from dil. alc., m.  $161.5^\circ$ . *Benzoylisopropylsemicarbaside*, from A warmed in  $\text{C}_6\text{H}_6$  with  $\text{BzCl}$  and  $\text{NaHCO}_3$ , needles from 95% alc., m.  $228^\circ$ ; heated 0.5 hr. at  $80^\circ$  with 20 parts of 30%  $\text{NaOH}$  it loses 1



mol.  $\text{H}_2\text{O}$  and on cooling yields the sodium salt, hair-like needles, of 3-hydroxy-1-iso-propyl-5-phenyltriazole, prisms from  $\text{H}_2\text{O}$ , m.  $185.5^\circ$ . With the calcd. amt. of  $\text{KMnO}_4$  A in  $\text{H}_2\text{O}$  gives  $\text{Me}_2\text{C}:\text{NNHCONH}_2$ , while in acid soln. there is formed, together with much of the  $\text{Me}_2\text{C}:\text{NNHCONH}_2$ , 2-carboxamidoazopropane,  $\text{Me}_2\text{CHN}:\text{NCONH}_2$ , slender, deep yellow prisms from  $\text{C}_6\text{H}_6$ -petroleum ether, m.  $65.5-6.0^\circ$ , does not form salts with acids, quickly rearranges into  $\text{Me}_2\text{C}:\text{NNHCONH}_2$  in  $\text{H}_2\text{O}$  in the presence of a trace of  $\text{KOH}$ , more slowly in acid soln. (also on long standing in the air without a solvent); it is probably formed also as an intermediate product in the oxidation of A in alk. soln., for it can be isolated in small amt. if the strongly cooled  $\text{KMnO}_4$  soln. is added to A in  $\text{H}_2\text{O}$  containing ice and the soln. is immediately extd. with  $\text{Et}_2\text{O}$ ; Br also produces the azo compd. but  $\text{H}_2\text{O}_2$  gives only  $\text{Me}_2\text{C}:\text{NNHCONH}_2$ .  $\text{PhNHNHEt}$  (isolated as the oxalate, long prismatic plates, m.  $166-7^\circ$ ) is obtained in about 95% yield from  $\text{MeCH}:\text{NNHPh}$  by the Skita method; the oxalate in glacial  $\text{AcOH}$  with a slight excess of  $\text{KNCO}$  gives phenylethylsemicarbazide, microneedles from  $\text{C}_6\text{H}_6$ , m.  $138^\circ$ .  $\text{Me}_2\text{C}:\text{NNHPh}$  can be reduced with equal ease. Menthylsemicarbazide, from menthone semicarbazone, acicular needles from  $\text{AcOEt}$ , m.  $179-80^\circ$ ,  $[\alpha]_D^{20} -43.8^\circ$  ( $\text{MeOH}$ ), is a strongly reducing substance. Bornylsemicarbazide, from camphor semicarbazone, prisms from dil. alc., m.  $192.5^\circ$ . C. A. R.

Some derivatives of *n*-butylmalonic acid. A. W. DOX AND L. YODER. *J. Am. Chem. Soc.* **44**, 1578-81(1922).—The object of this work was to prep. for physiol. tests a deriv. of barbital in which one of the Et groups is replaced by Bu. Butylmalonamide (3.8 g. from 10 g. of the Et ester and concd.  $\text{NH}_4\text{OH}$ ), slender hair-like needles from alc., m.  $200^\circ$ . Butyl-*N,N'*-dimethylmalonamide (7 g. from 10 g. of the ester and 33%  $\text{NH}_2\text{Me}$ ), needles from  $\text{H}_2\text{O}$ , m.  $184^\circ$ . Butylmalonanilide (10 g. from 10 g. of the ester and 8.7 g.  $\text{PhNH}_2$  at  $150^\circ$ ), needles from alc., m.  $193^\circ$ . *o*-Toluide (12 g. from 10 g. of the ester gently refluxed 1 hr. with 10 g.  $\text{MeC}_6\text{H}_4\text{NH}_2$ ), needles, m.  $202^\circ$ . 5-Butyl-barbituric acid, from  $\text{BuCH}(\text{CO}_2\text{Et})_2$ , Na in alc. and urea heated 6 hrs. at  $105^\circ$ , m.  $214^\circ$ , gives in  $\text{MeOH}$  with the calcd. amt. of Br, practically quant., 5-butyl-5-bromobarbituric acid, needles from  $\text{H}_2\text{O}$ , m.  $114^\circ$ . Diethyl butylbromomalonate (B) (245 g. from 196 g.  $\text{BuCH}(\text{CO}_2\text{Et})_2$  on the  $\text{H}_2\text{O}$  bath slowly treated with 160 g. Br and a little I), oil of a pleasant fruity odor,  $b_{20} 152-3^\circ$ ,  $d_{25}^{25} 1.238$ ,  $b_{727} 252-3^\circ$  (considerable liberation of  $\text{HBr}$ ). Diethyl butylphenoxymalonate (42 g. from 4.6 g. Na in 85 cc. alc. and 19 g.  $\text{PhOH}$  slowly treated with 60 g. B and finally refluxed 1 hr.), viscous oil,  $b_8 170-3^\circ$ ,  $d_{24}^{24} 1.063$ ; 10 g. with Na in alc. and urea heated 6 hrs. at  $105^\circ$  gives 6 g. 5-butyl-5-phenoxybarbituric acid (C), intensely bitter needles from  $\text{C}_6\text{H}_6$ - $\text{EtOH}$ , m.  $167^\circ$ . 5-Butyl-5-ethylbarbituric acid (D) (9 g. from 12.2 g.  $\text{BuEtC}(\text{CO}_2\text{Et})_2$ ,  $b_{728} 243-5^\circ$ , Na in alc. and urea), m.  $125^\circ$ . Physiologically, C and its lower homolog, ethylphenoxybarbituric acid (to be described in another paper), are inert but D is a strong hypnotic; the effective dose for mice is 0.075 mg./g. and the toxic dose 0.2 mg./g. body wt., about  $1/2$  the corresponding doses for barbital. C. A. R.

Amide formation from esters of secondary alkylmalonic acids. A. W. DOX AND L. YODER. *J. Am. Chem. Soc.* **44**, 1564-7(1922).—Fischer and Diltley's observations on the difference in rate of amide formation from Et esters of mono- and dialkylmalonic acids (*Ber.* **35**, 844(1902); *Ann.* **334**, 337(1904)) and those of Meyer on the difference in rate of amide formation from Me and Et esters of dialkylmalonic acids (*Ber.* **39**, 198(1906); *Monatsh.* **27**, 1083(1906)) have been extended to the Me and Et esters of sec-alkylmalonic acids. With respect to amide formation, these esters resemble the dialkylmalonic esters. During the course of the work the following new compds. were prepd.: Isopropylmalonamide (15.4 g. from 30 g.  $\text{Me}_2\text{CHCH}(\text{CO}_2\text{Me})_2$  shaken with 200 cc. of 28%  $\text{NH}_3$  and allowed to stand 24 hrs.), rhombohedron-like crystals from  $\text{H}_2\text{O}$ , m.  $280^\circ$ . Dimethyl sec-butylmalonate (18.5 g. from 50 g. of the Et ester,  $b_{718}$

234–6°, refluxed 2 hrs. in 150 cc. abs. MeOH with 1 g. Na, evapd. *in vacuo* and again refluxed in 150 cc. MeOH),  $b_{748}$  217–8°; 5 g. shaken with 50 cc. concd.  $\text{NH}_4\text{OH}$  and allowed to stand 2 days gives 2 g. *sec*-butylmalonamide, m. 242°. *Dimethyl cyclohexylmalonate* (23 g. from 132 g.  $\text{CH}_2(\text{CO}_2\text{Me})_2$ , 165 g.  $\text{C}_6\text{H}_{11}\text{Br}$  and 23 g. Na refluxed 10 hrs. in 400 cc. abs. alc.),  $b_4$  121–2°,  $d_{25}^{25}$  1.0737; 5 g. with concd.  $\text{NH}_4\text{OH}$  gives 2 g. of the *amide*, m. 305°, together with 1 g. needles, m. 169°, with 8.09% N, insol. in dil. NaOH. *Phenylmalonamide* (3 g. after 24 hrs. from 5 g.  $\text{PhCH}(\text{CO}_2\text{Me})_2$  in alc. and concd.  $\text{NH}_4\text{OH}$ ), m. 233°. With the Et esters of isopropyl-, *sec*-butyl- and cyclohexylmalonic acids, the amide formation was extremely slow, only a few crystals being obtained after even 2 weeks; the largest yield (5%) was obtained with the *sec*-Bu compd. *5-sec*-Butylbarbituric acid (6 g. from 11 g. of the malonic Et ester with urea and NaOEt at 105°), pearly scales from alc., m. 199°. *5-Cyclohexylbarbituric acid*, m. 254–6°. *5-Cyclohexyl-2-thiobarbituric acid*, obtained with  $\text{CS}(\text{NH}_2)_2$  instead of urea, small, flat, pale yellow needles, m. 188–9°.

C. A. R.

The action of ultraviolet light on the aqueous solutions of certain organic acids and their salts. F. M. JAEGER AND G. BERGER. *Rec. trav. chim.* 41, 71–81 (1922).—Previously J. (C. A. 7, 2551) noticed that aq.  $\text{CCl}_3\text{CO}_2\text{H}$  with less than 1 equiv. of freshly pptd.  $\text{Fe}(\text{OH})_3$  decomps. rapidly under the influence of diffuse sunlight or ultraviolet light from the Hg arc.  $\text{CO}_2$  and  $\text{C}_2\text{Cl}_4$  are formed. If excess  $\text{Fe}(\text{OH})_3$  is present the photochem. reaction is replaced by the reaction that takes place on heating:  $\text{CHCl}_3$  and  $\text{CO}_2$  are formed. If the soln. is electrolyzed  $\text{CCl}_3\text{CO}_2\text{CCl}_3$  (A) is formed as well as  $\text{COCl}_2$  and HCl. Catalysts decomp. A into  $\text{C}_2\text{Cl}_4$  +  $\text{CO}_2$ . Similarly aq.  $(\text{CBr}_3\text{CO}_2)_2\text{Fe}$  and  $(\text{CCl}_3\text{CCl}_3\text{CO}_2)_2\text{Fe}$  decomp., giving  $\text{CO}_2$  and  $\text{CHBr}_3$  and  $\text{C}_2\text{Cl}_4$ , resp. A neutral soln. of  $\text{KO}_2\text{CCBr}_3$  acted upon by the light of a Hg arc in a quartz flask becomes acid and the decompn. mainly follows the reaction:  $\text{CBr}_3\text{CO}_2^- + \text{H}_2\text{O} + \text{K}^+ \rightarrow 2\text{H}^+ + \text{K}^+ + 3\text{Br}^- + \text{CO} + \text{CO}_2$ . In more concd. solns.  $\text{CHBr}_3$  also is formed thus:  $\text{CBr}_3\text{CO}_2^- + \text{H}^+ \rightarrow \text{CHBr}_3 + \text{CO}_2$ , to a much larger extent. If  $\text{Fe}(\text{OH})_3$  was added  $\text{C}_2\text{Br}_4$  also is formed thus:  $2\text{CBr}_3\text{CO}_2^- + 2\text{Fe}^{+++} \rightarrow \text{C}_2\text{Br}_4 + 2\text{Fe}^{++} + 2\text{CO}_2$ . In this case all 3 reactions occur but the formation of  $\text{CHBr}_3$  is an accessory reaction. It is evident that the photochem. decompn. of the  $\text{CBr}_3\text{CO}_2^-$  ion depends on the simultaneous presence of other ions. The reaction in the presence of  $\text{Fe}^{+++}$  is much more rapid than when only  $\text{H}^+$  or  $\text{K}^+$  is present. This acceleration may to some extent be due to the facility with which  $\text{Fe}^{+++}$  combines with an electron to give  $\text{Fe}^{++}$ . The effects are more complicated with  $\text{CCl}_3\text{CO}_2\text{H}$ . In dil. solns. some  $\text{CO}_2$  is formed; in concd. solns. only CO is obtained. Free Cl is formed along with CO. As the period of exposure increases the ratio between  $\text{Cl}^-$  ions and CO mols. diminishes.  $\text{CCl}_3\text{CHO}$  is formed and decomposed thus:  $\text{CCl}_3\text{CHO} + \text{H}_2\text{O} \rightarrow 2\text{CO} + 3\text{H}^+ + 3\text{Cl}^-$  and the CO is oxidized by the  $\text{O}_2$  which also is present. The processes taking place may be represented in part, thus: (1)  $\text{CCl}_3\text{CO}_2^- + \text{H}^+ \rightarrow \text{CHCl}_3 + \text{CO}_2$  ( $\text{CHCl}_3 + 2\text{H}_2\text{O} \rightarrow 4\text{H}^+ + 3\text{Cl}^- + \text{HCO}_2^-$  according to Benrath (C. A. 5, 3458)); (2)  $2\text{CCl}_3\text{CO}_2^- + 2\text{Fe}^{+++} \rightarrow \text{C}_2\text{Cl}_4 + 2\text{Fe}^{++} + 2\text{CO}_2$ ; (3)  $\text{CCl}_3\text{CO}_2^- + \text{K}^+ + \text{H}_2\text{O} \rightarrow \text{CCl}_3\text{CHO} + \text{K}^+ + \text{OH}^- + \text{O}$ . The  $\text{CCl}_3\text{CHO}$  reacts as stated above and thus:  $\text{CCl}_3\text{CHO} + \text{H}_2\text{O} + \text{O}_2 \rightarrow 3\text{H}^+ + 3\text{Cl}^- + 2\text{CO}_2$ . The decompn., therefore, proceeds in 3 different directions, not counting accessory reactions, each of which is dependent upon the presence of other ions in the solns. and all are different from those occurring in electrolysis (mentioned above). The above results are to be considered in connection with those on  $\text{CH}_2\text{ClCO}_2\text{H}$  and  $\text{CHCl}_2\text{CO}_2\text{H}$  of Benrath (*l. c.*) and Euler and Cassel (C. A. 7, 3263) as follows:  $\text{CH}_2\text{ClCO}_2^- + \text{H}_2\text{O} \rightarrow \text{CH}_2(\text{OH})\text{CO}_2^- + \text{H}^+ + \text{Cl}^-$  and  $\text{CHCl}_2\text{CO}_2^- + 2\text{H}_2\text{O} \rightarrow \text{CH}(\text{OH})_2\text{CO}_2^- + 2\text{H}^+ + 2\text{Cl}^-$ .  $\text{CCl}_3\text{CH}(\text{OH})\text{CO}_2\text{K}$  illuminated by the Hg arc decomps. thus:  $\text{CCl}_3\text{CH}(\text{OH})\text{CO}_2^- + \text{K}^+ \rightarrow \text{CHCl}_2\text{CHO} + \text{Cl}^- + \text{K}^+ + \text{CO}_2$ . The  $\text{CHCl}_2\text{CHO}$  was identified by conversion into  $(\text{CHO})_2$  as its

semicarbazone. The photochem. reaction in this case is accompanied by or followed immediately by a mol. transposition so that the reaction gives the same products as thermal decompn. on boiling the aq. K salt. Dil. aq. Na chloromalonate illuminated 2 days reacts thus:  $\text{CHCl}(\text{CO}_2^-) + \text{H}_2\text{O} \rightarrow \text{HCO}_2^- + \text{CH}_2\text{ClCO}_2^-$ . The  $\text{CH}_2\text{ClCO}_2\text{H}$  reacts thus:  $\text{CH}_2\text{ClCO}_2^- + \text{H}_2\text{O} \rightarrow \text{CH}_2(\text{OH})\text{CO}_2^- + \text{H}^+ + \text{Cl}^-$  and perhaps  $\text{CH}_2\text{ClCO}_2^- + \text{H}_2\text{O} \rightarrow \text{CHOCO}_2^- + \text{H}^+ + \text{Cl}^- + 2\text{H}$  with subsequent oxidation of the H. The liberation of  $\text{CO}_2$  may be as much as 5 times as fast as the formation of  $\text{Cl}^-$  ions so that the formation of  $\text{CH}_2\text{ClCO}_2\text{H}$  is the primary reaction.  $\text{PhCHBrCO}_2\text{H}$  illuminated similarly decomps., first giving  $\text{PhCH}(\text{OH})\text{CO}_2\text{H}$ , no doubt thus:  $\text{PhCHBrCO}_2^- + \text{K}^+ + \text{H}_2\text{O} \rightarrow \text{PhCH}(\text{OH})\text{CO}_2^- + \text{H}^+ + \text{Br}^- + \text{K}^+$ , which decomps., giving  $\text{BzH}$  and  $\text{HCO}_2\text{H}$ .  $\text{Ph}_2\text{CCO}_2\text{H}$  similarly illuminated reacts thus:  $\text{Ph}_2\text{CCO}_2^- + \text{K}^+ + \text{H}_2\text{O} \rightarrow \text{Ph}_2\text{CH} + \text{HCO}_2^- + \text{K}^+$  but concd. solns. mainly thus:  $\text{Ph}_2\text{CCO}_2^- + \text{K}^+ + \text{H}_2\text{O} \rightarrow \text{Ph}_2\text{COH} + \text{K}^+ + \text{HCO}_2^-$ . The results described show that the action of light on org. acid anions in  $\text{H}_2\text{O}$  may be quite different depending on the character of the cations ( $\text{H}^+$ ,  $\text{K}^+$ ,  $\text{Na}^+$ ,  $\text{Fe}^{+++}$ ) which are present at the same time. The effect is only rarely identical with that produced by heating the soln. and is not directly comparable to the results obtained by electrolyzing the solns. Possibly the difference in sp. absorption of these solns. caused by the presence of different ions detcs. the divergence of the photochem. reactions observed with the same acid. R. J. WITZEMANN

**Synthesis of urea from ammonia.** C. MATIGNON AND M. FRÉJACQUES. *Ann. chim.* 17, 257-304 (1922).—See C. A. 16, 1395. E. H.

**Labile nature of the halogen atoms in organic compounds. III. The absorption spectra of bromomalonic derivatives and nitroparaffins and their bearing on the question of an oxygen-halogen linking.** HUGH GRAHAM AND ALEX K. MACBETH. *J. Chem. Soc.* 121, 1109-15 (1922); cf. Henderson and Macbeth, C. A. 16, 2473.—Absorption spectra are shown for the following:  $\text{CH}_2(\text{CO}_2\text{Me})_2$  in alc.,  $\text{H}_2\text{O}$ , 0.1 N NaOH, EtOH-EtONa;  $\text{CHBr}(\text{CO}_2\text{Et})_2$  in EtOH;  $\text{CBr}_2(\text{CO}_2\text{Et})_2$  in EtOH;  $\text{CEt}_2(\text{CO}_2\text{Et})_2$  in EtOH;  $\text{CHCl}(\text{CO}_2\text{Et})_2$  and  $\text{CMeBr}(\text{CO}_2\text{Et})_2$ ,  $\text{CEtBr}(\text{CO}_2\text{Et})_2$  and  $\text{CPrBr}(\text{CO}_2\text{Et})_2$  in EtOH;  $\text{CHNO}_2(\text{CO}_2\text{Et})_2$ ,  $\text{CBr}(\text{NO}_2)(\text{CO}_2\text{Et})_2$  and  $\text{C}_2\text{H}_5(\text{NO}_2)(\text{CO}_2\text{Et})_2$  in EtOH;  $\text{CK}(\text{NO}_2)(\text{CO}_2\text{Et})_2$  in  $\text{H}_2\text{O}$ ;  $\text{CH}_2(\text{CONH}_2)_2$  in  $\text{H}_2\text{O}$  and 0.1 N NaOH;  $\text{CHBr}(\text{CONH}_2)_2$  and  $\text{CBr}_2(\text{CONH}_2)_2$  in  $\text{H}_2\text{O}$ ;  $\text{C}(\text{NO}_2)_2\text{Br}$  and  $\text{C}(\text{NO}_2)_2\text{Cl}$  in EtOH;  $\text{CH}(\text{NO}_2)_2$  in  $\text{H}_2\text{SO}_4$  and K salt in  $\text{H}_2\text{O}$ ;  $\text{CBr}_2(\text{NO}_2)_2$  and  $\text{CPhBr}(\text{NO}_2)_2$  in EtOH, and the K salts of  $\text{CHBr}(\text{NO}_2)_2$  and  $\text{PhCH}(\text{NO}_2)_2$  in  $\text{H}_2\text{O}$ . The absorption spectra of all the types examd. furnish direct evidence against the presence of an O-halogen linking in the reactive halogen compds. and the labile nature of the halogen atom in such substances cannot therefore be accounted for on such grounds. IV. The tautomeric hydrogen hypothesis and the removal of the halogen atom from aromatic nitro compounds. A. K. MACBETH. *Ibid* 1116-21; cf. Burton and Kenner, C. A. 16, 1944.—M. believes that the labile nature of the halogen atom in org. compds. is not connected with a tendency of the substances to acquire a tautomeric H atom but is satisfactorily accounted for by the electropositive character of these atoms. Consideration of the aromatic  $\text{NO}_2$  compds. from the point of view of the polarities of the groups indicates that the halogen atom is electropositive in  $\text{NH}_2$  compds. which contain the  $\text{NH}_2$  groups *o*- or *p*- to it.  $\text{CHCl}(\text{CO}_2\text{Et})_2$  and  $\text{CCl}_2(\text{CO}_2\text{Et})_2$  decomp.  $\text{N}_2\text{H}_4$  with the liberation of the theoretical amt. of N.  $\text{AcCHClCOMe}$ ,  $\text{AcCCl}_2\text{COMe}$  and cyclohexanespiro-4,4-dichlorocyclohexan-3,5-dione do not decomp.  $\text{N}_2\text{H}_4$ , while the 4,4- $\text{Br}_2$  deriv. loses 1 Br atom. Even gentle reduction of picryl chloride (Fe and very dil. HCl) removed the Cl while reducing the  $\text{NO}_2$  groups.

C. J. WEST

**Complex mercuri-compounds of glutamic acid and aconitic acid.** P. E. VERKADE. *Chem. Weekblad* 19, 261 (1922).—It is known that unsatd. *cis*-acids form complex mercuri-compds., while the analogous *trans*-acids do not. *sym*-Glutamic acid was found

**Double nitriles.** A. PIL. *Naturwetenschapp. Tijdschr.* 3, 89-90(1921).— $\text{MeMgCl}$  reacting with cyanides forms ketones. P. tried to obtain *diketones* by treating  $\text{MeMgCl}$  with dicyanides, e. g., with  $\text{CNC}_6\text{H}_4\text{CN}$ , but *without success*. Only a resinous mass is obtained which contains a small quantity of the compd.:  $\text{MeC}(\text{CONH}_2)_2\text{CHCN}$ .

R. BEUTNER

to yield a complex mercuri-salt, if treated with  $\text{Hg}(\text{OAc})_2$ ; it, therefore, reacts in a labile *cis*-form, which is known to be formed by the action of  $\text{Br}$  as an intermediary compd. If the reaction was done in alk. soln. it was possible to get back  $\beta$ -hydroxyglutaric acid. Aconitic acid does not form a complex mercuri-salt; however, the analogous hydroxy-anhydro-acid,  $\text{HO}_2\text{CCH}:\text{C}(\text{CO}_2\text{O})\text{C}(\text{OH})\text{CH}_3$ , does. From the complex mercuri-compd. of this acid it was possible to obtain citric acid in alk. soln.

R. BEUTNER

**Reply to J. Klimont's paper on the coördination form of glycerides.** AD. GRÜN. *Oesterr. Chem. Zig.* 25, 73-4(1922).—Controversial. Cf. C. A. 16, 1744, 2677.

A. R. ALBRIGHT

**Detection of thymine in the presence of sugar.** H. J. DEURL AND O. BAUDISCH. *J. Am. Chem. Soc.* 44, 1581-4(1922); cf. C. A. 16, 1215.—The method for the detection of thymine (A) recently described, which is based on the oxidation of the A by  $\text{FeSO}_4$  and  $\text{NaHCO}_3$  in air to urea,  $\text{AcCO}_2\text{H}$ , acetol and possibly  $\text{HCO}_2\text{H}$  and subsequent detection of the acetol and  $\text{AcCO}_2\text{H}$  by color reactions and of the urea with xanthydrol, is not applicable in the presence of sugars, which also yield acetol when distd. with  $\text{NaHCO}_3$  but the A can be pptd. with  $\text{HgCl}_2$  and enough  $\text{NaOH}$  to make the mixt. distinctly alk., centrifuged about 10 min., thoroughly mixed with distd.  $\text{H}_2\text{O}$ , again centrifuged, decompd. in  $\text{H}_2\text{O}$  suspension with  $\text{H}_2\text{S}$ , filtered and boiled to remove the  $\text{H}_2\text{S}$  and then oxidized as already described; 10-5 mg. A in 100-50 cc. soln. will give in the acetol test a fluorescence which can be seen in daylight and 30 mg. A will give a strong  $\text{AcCO}_2\text{H}$  test; with an Fe arc light as little as 1 mg. A can be detected by the acetol test. The method has been successfully applied in the examn. of the pyrimidines obtained from the nucleic acid of the tubercle bacillus.

C. A. R.

**Acetol. I. A new test for carbohydrates.** O. BAUDISCH AND H. J. DEURL. *J. Am. Chem. Soc.* 44, 1585-7(1922); cf. preceding abstr.—Arabinose, xylose, ribose, lyxose, glucose fructose, mannose, galactose, glucosamine, lactose, sucrose, maltose and dextrin on distn. with  $\text{NaHCO}_3$  yield acetol, which can be detected by the fluorescent 3-hydroxyquinoline which it forms with  $o\text{-H}_2\text{NC}_6\text{H}_4\text{CHO}$ . The delicacy of the reaction has been detd. only for glucose, 5 mg. of which gives a positive test; with the other carbohydrates the test was carried out with 0.1 g. in 100 cc. of 5%  $\text{NaHCO}_3$ ; of sucrose, 0.2 g. was necessary for a positive test. Under the same conditions  $\text{AcCH}_2\text{CO}_2\text{H}$ , glycerol,  $\text{MeCH}(\text{OH})\text{CH}_2\text{CO}_2\text{H}$ , lactic acid, starch and glycogen give no acetol.

C. A. R.

**A property of ethyl tartrate.** T. S. PATTERSON. *J. Chem. Soc.* 121, 1042-4(1922); cf. Lowry and Cutter, C. A. 16, 1935.—P. points out that Et tartrate contains as an impurity a green compd. which becomes colorless on standing. On heating the colorless ester to  $120^\circ$  it develops a green color. In distn. of the ester, although the liquid trapped in the neck of a Claisen distg. flask and the hot vapor may be quite colorless, the distillate may be distinctly green. This can be fractionated out and is no ordinary impurity. No indication of its nature is given.

C. J. WEST

**Castelin, a new glucoside from Castela nicholsoni.** L. P. BOSMAN. *J. Chem. Soc.* 121, 969-72(1922).—The extn. of *Castela nicholsoni* with  $\text{H}_2\text{O}$  or alc. and concn. of the ext., gave 1st castelamarin and then castelin. Castelin, purified by repeated crystn. from  $\text{H}_2\text{O}$ , forms long needles with  $3\text{H}_2\text{O}$ , m.  $205^\circ$ . It is sol. in 85 parts  $\text{H}_2\text{O}$

at room temp. and in 25 parts at 100°. It is very hygroscopic, taking up 8% H<sub>2</sub>O in 1 hr. It has  $[\alpha]_D^{20}$  62.9°. Upon hydrolysis with 20% HCl, 20% of *castelagenin* is obtained, large prisms, m. 240–1°,  $[\alpha]_D^{20}$  59°. It appears to be a lactic acid (substituted succinic acid ?) and on oxidation with 30% HNO<sub>3</sub> gives an acid, m. 128–9°, which gives the fluorescein reaction. The sugar from the hydrolysis is glucose. C. J. WEST

**Capsularin**, a glucoside from jute leaf. HARIDAS SAHA AND KUMUD NATH CHoudhury. *J. Chem. Soc.* 121, 1044–6(1922).—*Capsularin*, C<sub>22</sub>H<sub>16</sub>O<sub>8</sub>, isolated from the aq. ext. of *Corchorus capsularis* leaves by pptn. of the clarified ext. with tannic acid and decomn. of the ppt. by Ba(OH)<sub>2</sub>, needles, m. 175–6°,  $[\alpha]_D^{20}$  –23.6° in EtOH, gives a neutral aq. soln., and a red color with green fluorescence when treated with H<sub>2</sub>SO<sub>4</sub>. *Pentaacetate*, m. 194°. Upon hydrolysis, glucose is formed, and the substance, C<sub>16</sub>H<sub>10</sub>O<sub>6</sub>, small needles, m. 185°; it does not react with PhNHNH<sub>2</sub> but reduces alk. KMnO<sub>4</sub> and decolorizes Br in CCl<sub>4</sub>. With Ac<sub>2</sub>O, CHCl<sub>3</sub> and concd. H<sub>2</sub>SO<sub>4</sub> it gives a violet color changing to green, characteristic of the alcs. of the series C<sub>n</sub>H<sub>2n–6</sub>O<sub>4</sub> (Powers)

C. J. WEST

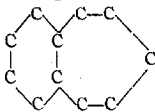
**Constitution of polysaccharides. IV. Inulin.** J. C. IRVINE, E. S. STEELS AND M. I. SHANNON. *J. Chem. Soc.* 121, 1060–78(1922); cf. *C. A.* 15, 1017; 16, 411.—More than half the paper is taken up with a review of the work of the sugars and a plea that the field be reserved for St. Andrews labs. The former results, which indicated that dimethylinulin (A) was the principal product at a certain stage of the methylation, have been confirmed. The quality of charcoal used in the purification greatly influences the yield, and also the phys. properties of the compd. The Et<sub>2</sub>O-sol. portion probably consists of methylated inulins. On hydrolysis with (CO<sub>2</sub>H)<sub>2</sub> in dil. EtOH, 72% of dimethyl-γ-fructose, with  $[\alpha]_D^{20}$  17.1° (c 2.675 in CHCl<sub>3</sub>), were obtained. The phys. properties of trimethylinulin vary in marked degree according to the exptl. procedure used in its prepn. At least 3 forms have been isolated, depending upon the method of methylation: sol. in Et<sub>2</sub>O and *l*-rotatory; sol. in Et<sub>2</sub>O and *d*-rotatory; and insol. in Et<sub>2</sub>O and *l*-rotatory. All 3 forms yield trimethyl-γ-fructose upon hydrolysis with (CO<sub>2</sub>H)<sub>2</sub>.

C. J. WEST

**Constitution of lignin.** S. V. HINTIKKA. *Cellulosechem.* 2, 63–4(1921).—Pochemical against Klason (*C. A.* 14, 3229).

C. J. WEST

**Two strain-free cycloheptane models.** ERNST MOHR. *J. prakt. Chem.* 103, 316–28(1922).—The possibility is demonstrated of constructing 2 strain-free cycloheptane models from Kekulé at. models. The problem is really that of constructing equilateral, equiangular, 7-sided, space polygons in which each angle equals the octahedral surface angle, 109°28'16". Also, various strain-free models of the bicyclic

formula  can be constructed. In fact, a strain-free cyclo-

hexane ring may be attached to each of the several possible positions in the 2 strain-free cycloheptane models, in some cases in the *cis*-, in others in the *trans*-, and in still others in either the *cis*- or *trans*-position.

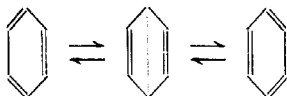
R. H. LOMBARD

**The structure of benzene.** M. L. HUGGINS. *Science* 55, 679–80(1922).—H. has developed a theory of conjugation similar to Erlenmeyer's (*Ann.* 316, 43, 71, 75 (1901)), which supports Körner's model for the structure of PhH. X-ray analysis of graphite (cf. *C. A.* 11, 1786; 12, 449, 649, 786) shows that its structure is layers of hexagons similar to the Körner PhH hexagon; and studies of the phys. properties of cryst. PhH and of a no. of PhH derivs. in which the molcs. are probably arranged in the same kind of layers as occur in graphite, yield values for the dimensions of the hexagon almost

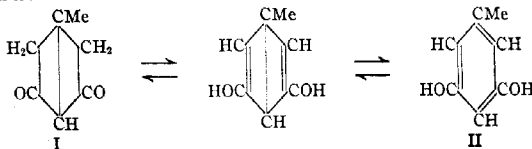
identical with those of graphite; these data constitute H.'s proof of the PhH structure; the method of proof and its further application will be presented in a later paper.

A. R. ALBRIGT

**Structure of the benzene nucleus. I. Intra-nuclear tautomerism.** C. K. INGOLD. *J. Chem. Soc.* 121, 1133-43(1922).—"It is the purpose of this paper to show that Dewar's formula, considered in relation to present-day conceptions of C tautomerism, is the clue to the constitution of the aromatic nucleus." I. believes that the true conception of the  $C_6H_6$  mol. is a dynamic one, in which the bridged phase (Dewar) occupies a position intermediate between the 2 double-bonded phases:



I. desires "to adumbrate by means of a few chosen examples the manner in which some degree of preliminary justification of what appears to be a reasonable working hypothesis is to be sought." **II. Synthetic formation of the bridged modification of the nucleus.** *Ibid* 1143-53.—Ethyl  $\beta$ -methylmethanetriacetate, obtained in almost quant. yield by mixing 500 g. acid with 1 l. abs. EtOH and 100 cc. concd.  $H_2SO_4$  and conducting a current of alc. vapor into the flask so that the level of the liquid remained unchanged, mobile oil,  $b_{25}$  185-7°. The action of Na in hot  $C_6H_5Me_3$  upon this ester gave, in the neutral ext., Et  $\beta$ -methylglutaconate,  $AcCH_2CO_2Et$ , unchanged ester, and ethyl 3-methylcyclobutan-1-one-3-acetate (I),  $b_{24}$  130-1°, the *p*-nitrophenylhydrazone of which forms brick-red feathery needles, m. 175° (decompn.). The most characteristic property of this ketone is the ease with which it is changed into orcinol (II) by the action of Na. The acid fraction contained acids corresponding to the above esters. The quasi-acid fraction from the reaction of K contained orcinol. The reaction may be as follows:



C. J. WESR

The influence of some substituents in the benzene nucleus on the mobility of chlorine in the sidechains in connection with the problem of benzene substitution. S. C. J. OLIVIER. *Chem. Weekblad* 19, 260(1922).—The reaction is studied between a sulfonyl chloride and  $AlCl_3$  on the one side and various substituted benzenes on the other side. The velocity of this reaction is increased if a Me group is substituted in the benzene; it decreases if Br, Cl and  $NO_2$  are substituted. Another reaction studied is the one between  $C_6H_5$  and various substituted benzenesulfonyl chlorides; the influence of the substituents was found to be the same as above. The same is observed if the velocity of sapon. of various substituted benzoyl chlorides is observed. Not only the kind of the substituents but also their location influences these reactions. The following series is found in all cases:  $p\text{-Me} > o\text{-Me} > m\text{-Me} > H > p\text{-Cl} > o\text{-Cl} > m\text{-Cl} > m\text{-NO}_2 > o\text{-NO}_2 > p\text{-NO}_2$ .

R. BEUTNER

**Sulfuryl chloride. II. A new chlorinating agent: preparation of polychloro derivatives of benzene.** OSWALD SILBERRAD. *J. Chem. Soc.* 121, 1015-22(1922); cf. C. A. 16, 915.—Aluminium chlorosulfoxide,  $AlCl_3 \cdot SO_2$ , is formed by shaking a mixt. of 15 g.  $AlCl_3$  and 30 cc.  $SO_2Cl_2$  until soln. results (8 hrs.). A brown flocculent ppt. contg. iron originally present in the  $AlCl_3$  as an impurity, is filtered off. The soln.

fumes strongly in the air and has an odor of  $\text{PCl}_5$ . If  $\text{S}_2\text{Cl}_2$  or finely ground S is added to the above soln., *aluminium sulfur chloride*,  $\text{Al}_2\text{S}_2\text{Cl}_6$ , is obtained, though it is best prepd. by adding the  $\text{S}_2\text{Cl}_2$  in  $\text{SOCl}_2$ ; it forms microneedles or leaflets and fumes strongly in the air, giving off the odor of  $\text{S}_2\text{Cl}_2$ . It crysts. from  $\text{SOCl}_2$  but catalyzes the decompn. of  $\text{SO}_2\text{Cl}_2$ ,  $\text{SO}_2$  and Cl being evolved. The compd. to be chlorinated (1–2 mols.) and anhydrous  $\text{AlCl}_3$  (5–10 g.) were placed in a flask fitted with 2 condensers, so arranged that the gases passed up the 1st reflux condenser and down the 2nd, the condensation from the 2nd being returned to the reaction flask through a trap, while the gases evolved were conducted through a valve to a vessel contg. 10 l.  $\text{H}_2\text{O}$  to absorb the  $\text{SO}_2$  and HCl. 225 g.  $\text{PhCl}$  and 286 g. chlorinating agent ( $\text{SO}_2\text{Cl}_2$  and  $\text{S}_2\text{Cl}_2$ ) gave 190 g.  $p\text{-C}_6\text{H}_4\text{Cl}_2$  and 37 g.  $o\text{-C}_6\text{H}_4\text{Cl}_2$ . 147 g.  $p\text{-C}_6\text{H}_4\text{Cl}_2$ , when treated with 146 g. of the reagent in 1 lot, gave 105 g.  $1,2,4\text{-C}_6\text{H}_3\text{Cl}_3$ ; if 294 g.  $p\text{-C}_6\text{H}_4\text{Cl}_2$  are treated with 582 g. of the reagent, 302 g.  $1,2,4,5\text{-C}_6\text{H}_3\text{Cl}_4$  are obtained. The residue from 3 such expts. gave 42 g. pure  $1,2,3,5\text{-C}_6\text{H}_3\text{Cl}_4$ , m.  $51^\circ$ . A small yield of  $\text{C}_6\text{HCl}_5$  may be obtained by the reaction of the chlorinating agent upon  $1,2,4,5\text{-C}_6\text{H}_3\text{Cl}_4$  in  $\text{SOCl}_2$ , but the method is not recommended for its prepn. A 70% yield of  $\text{C}_6\text{Cl}_6$  may be obtained from the reaction of 314 g. of the chlorinating agent and 216 g.  $\text{C}_6\text{H}_5\text{Cl}_4$ .

C. J. WEST

**Amine oxidation. III. Bivalent nitrogen: diarylacylhydrazyls.** STEFAN GOLDSCHMIDT and KARL EULER. *Ber.* 55B, 616–28 (1922); cf. C. A. 14, 2200.—From the color phenomena and other reactions shown by the hexaphenyltetrazane (A),  $\text{Ph}_2\text{NNPh-NPhNPh}$ , described in the earlier papers, it was concluded that A has the greatest tendency of all known compds. to dissociate into radicals with bivalent N, although an exact proof of such dissociation (by mol. wt. detns.) could not be supplied on account of the extraordinary instability of the radical. A no. of other tetrazanes have been prepd. and found to fall in the following order of increasing tendency to dissociate:  $(\text{NPhNPhAc})_2$ ,  $(\text{NPhNPhBz})_2$ ,  $[\text{N}(\text{C}_6\text{H}_7)\text{N}(\text{C}_6\text{H}_7)\text{Ac}]_2$ ,  $[\text{N}(\text{C}_6\text{H}_7)\text{N}(\text{C}_6\text{H}_7)\text{Bz}]_2$ ,  $(\text{C}_6\text{H}_7 = p\text{-MeC}_6\text{H}_4)$ .  $\text{PhNHNPhAc}$  is obtained in 12 g. yield from 18 g.  $\text{PhNHNHPh}$  and 50 g.  $\text{Ac}_2\text{O}$  heated at  $40\text{--}50^\circ$  until soln. results and crystn. begins; 80 g. suspended in 50 cc. cold  $\text{C}_6\text{H}_6$  and shaken 24 hrs. with 300 g.  $\text{PhO}_2$  and a few g. of granular  $\text{K}_2\text{CO}_3$ , filtered, freed from the  $\text{C}_6\text{H}_6$  *in vacuo* and digested with  $\text{Et}_2\text{O}$  yields 17.5 g.  $\alpha, \alpha', \beta, \beta'$ -tetraphenyl- $\alpha, \alpha'$ -diacetyltetrazane (B), faintly yellow prismatic crystals from  $\text{CHCl}_3\text{-Et}_2\text{O}$ , m.  $126^\circ$  (decompn.), relatively easily sol. in  $\text{Me}_2\text{CO}$  and  $\text{AcOEt}$ , easily in  $\text{C}_6\text{H}_6$  and  $\text{PhMe}$ , very easily in  $\text{CHCl}_3$ , difficultly in  $\text{MeOH}$  and  $\text{EtOH}$ , very difficultly in petr. ether and  $\text{Et}_2\text{O}$ , sol. in  $\text{AcOH}$  without color but becoming brown-yellow on standing, in concd.  $\text{H}_2\text{SO}_4$  with bright reddish color which soon becomes brown and is turned violet-red by  $\text{H}_2\text{O}$  and yellow by  $\text{NaOH}$ , mol. wt. in freezing  $\text{C}_6\text{H}_6$  422–3 (calcd. 450); the faintly violet-brown  $\text{CHCl}_3$  soln. does not obey Beers' law; the faintly yellowish  $\text{PhMe}$  soln. becomes brown-violet on rapid heating to boiling and returns to its original yellowish color on rapid cooling; on repeating the process the color becomes light green on heating, yellow on cooling; long boiling in  $\text{PhMe}$  and even in  $\text{C}_6\text{H}_6$  completely decomp. the B. Treated in cold  $\text{C}_6\text{H}_6$  with dry HCl, B gives  $\text{PhNHAc}$  and  $p\text{-ClC}_6\text{H}_4\text{-N:NPh}$ . There is probably first formed an addition product,  $\text{NPhAcNPhHCINPh-NPhAc}$ , which decomp. into  $\text{AcNHPh}$  and  $\text{NPhAcNPhNPhCl}$  which in the presence of HCl rearranges into  $\text{NPhAcNPhNHC}_6\text{H}_4\text{Cl}$ , which then decomp. into  $\text{PhNHAc}$  and  $\text{PhN:NCC}_6\text{H}_4\text{Cl}$ . A warm soln. of B treated with carefully purified NO becomes yellow and finally red-brown and on evapn. *in vacuo* in a current of  $\text{CO}_2$  leaves a tar.  $\text{NPhAcNHPh}$  in  $\text{CHCl}_3$  treated with  $\text{N}_2\text{O}_5$  until the soln. has become light green, then freed from the excess of  $\text{N}_2\text{O}_5$  with  $\text{CO}_2$ , washed with  $\text{NaOH}$  and  $\text{H}_2\text{O}$  and evapd. *in vacuo* gives a yellowish tar showing no tendency to cryst. but having, after long drying over  $\text{P}_2\text{O}_5$ , the compn. of the expected *N-nitroso-N'-acetylhydrazobenzene*.  $\alpha, \alpha'$ -Di-*benzoyl- $\alpha, \alpha', \beta, \beta'$ -tetraphenyltetrazane* (C), from the  $138^\circ$  form of  $\text{NPhBzNHPh}$  in  $\text{C}_6\text{H}_6$

with  $\text{PbO}_2$  and  $\text{K}_2\text{CO}_3$ , crystals from  $\text{C}_6\text{H}_6\text{-Et}_2\text{O}$ , m.  $114^\circ$  (decompn.), sol. in concd.  $\text{H}_2\text{SO}_4$  (with decompn.) with brown-red color, gives in  $\text{C}_6\text{H}_6$  with  $\text{HCl}$  in  $\text{Et}_2\text{O}$  a red color, mol. wt. in freezing  $\text{C}_6\text{H}_6$  482–413 (449, 421, 413 after 11, 14 and 29 hrs., resp.; calcd. 574); the faintly light green solns. in  $\text{C}_6\text{H}_6$ ,  $\text{PhMe}$  and  $\text{CHCl}_3$  do not obey Beers' law; on standing they rapidly become yellow as the result of decompn.; when rapidly heated, the  $\text{CHCl}_3$  soln. becomes a much deeper green and yellow again on rapid cooling; long heating, especially in  $\text{PhMe}$ , produces complete decompn. Allowed to stand 5 hrs. under  $\text{CO}_2$  in 60 cc.  $\text{C}_6\text{H}_6$  with 2 g.  $\text{C}_6\text{Ph}_3$  and then concd. to a small vol. *in vacuo*, 2 g. **C** gives 0.6 g.  $\alpha, \beta$ -diphenyl- $\beta$ -triphenylmethyl- $\alpha$ -benzoylhydrazine, prismatic tables from alc., becomes brownish  $120^\circ$ , m.  $165\text{--}6^\circ$  (decompn.). *N*-Nitroso-*N'*-benzoylhydrazobenzene (0.4 g. from 1 g. **C** in  $\text{C}_6\text{H}_6$  with  $\text{NO}$  at room temp.), prismatic leaflets from alc., m.  $104^\circ$ , evolves gas and turns red-brown in boiling  $\text{BzOEt}$ . The  $126^\circ$  form of  $\text{NPh-BzNHPh}$  shaken in  $\text{C}_6\text{H}_6$  with  $\text{PbO}_2$  gives  $\text{PhN:NPh}$ . *N*-Acetylhydrazo-*p*-toluene, from  $(p\text{-MeC}_6\text{H}_4\text{NH})_2$  and  $\text{Ac}_2\text{O}$  at  $40\text{--}50^\circ$ , prismatic tables, m.  $120^\circ$ , blackened by concd.  $\text{H}_2\text{SO}_4$ ; 3 g. gives with  $\text{PbO}_2$  in  $\text{C}_6\text{H}_6$  2 g.  $\alpha, \alpha'$ -diacetyl- $\alpha, \alpha', \beta, \beta'$ -tetra-*p*-tolylettrazane, prismatic crystals from  $\text{C}_6\text{H}_6\text{-Et}_2\text{O}$ -petr. ether, m.  $109^\circ$  (decompn.), sol. in  $\text{AcOH}$  with golden yellow, in concd.  $\text{H}_2\text{SO}_4$  with red-brown color, gives in  $\text{C}_6\text{H}_6$  with  $\text{HCl}$  in  $\text{Et}_2\text{O}$  a red color; the  $\text{CHCl}_3$  soln. is at first colorless but quickly becomes faintly brownish violet and does not obey Beers' law;  $\text{C}_6\text{H}_6$ ,  $\text{PhMe}$  and  $\text{Me}_2\text{CO}$  solns. behave in the same way; heating deepens the violet color, which again pales out on cooling; mol. wt. in freezing  $\text{C}_6\text{H}_6$  458–503 (calcd. 506), the solns. being faintly violet during the detns., markedly brownish towards the end and yellow after 10 hrs.;  $\alpha, \beta$ -di-*p*-tolyl- $\beta$ -triphenylmethyl- $\alpha$ -acetylhydrazine (0.4 g. from 0.5 g. of the tetrazane), m.  $156\text{--}7^\circ$  (decompn.), sol. in concd.  $\text{H}_2\text{SO}_4$  (with decompn.) with greenish yellow color.  $\alpha, \alpha'$ -Dibenzoyl- $\alpha, \alpha', \beta, \beta'$ -tetra-*p*-tolylettrazane, from the  $130^\circ$  form of  $\text{N}(\text{C}_6\text{H}_5\text{Me})\text{BzNHC}_6\text{H}_5\text{Me}$ , needle aggregates, m.  $115^\circ$  (decompn.);  $\text{CHCl}_3$  solns. are light green but decomp. with extreme rapidity and the non-conformity with Beers' law is best observed with  $\text{C}_6\text{H}_6$  solns.; even gentle warming produces a strong deepening of the green color, which fades out again on cooling but rapid work is necessary as even cold solns. rapidly become brown as the result of decompn.; at the first instant of prepn. the solns. in org. solvents are colorless; with  $\text{C}_6\text{Ph}_3$  is obtained  $\alpha, \beta$ -di-*p*-tolyl- $\beta$ -triphenylmethyl- $\alpha$ -benzoylhydrazine, prismatic crystals from  $\text{C}_6\text{H}_6\text{-Et}_2\text{O}$ -petr. ether, m.  $146\text{--}7^\circ$  (decompn.), sol. in concd.  $\text{H}_2\text{SO}_4$  (decompn.) with yellow-green color. IV.  $\alpha, \alpha'$ -Diphenyl- $\beta$ -trinitrophenylhydrazyl. STEFAN GOLDSCHMIDT and KONRAD RENN. *Ibid* 628–43.—In the hope that radicals of the type  $\text{Ph}_2\text{NNR}$ , where R is a *p*-substituted residue, would be more stable than that which is assumed to result from the dissociation of  $\text{Ph}_2\text{NPhNPhNPh}_2$  and would hence permit of making detns. of their mol. wts., attempts were made to prep. hydrazines of the general structure  $\text{Ph}_2\text{NNHR}$  but neither Wieland and Roseau's (*C. A.* 9, 2540) nor Busch's method (*C. A.* 1, 2130) worked and equally unsuccessful were efforts to prep. such compds. by reactions involving coupling of N to N. The series

of reactions  $\text{Ph}_2\text{NNH}_2 + \text{O:C}_6\text{H}_4\text{:O} \xrightarrow{\text{H}_2} \text{Ph}_2\text{NN:C}_6\text{H}_4\text{:O} \xrightarrow{\text{H}_2} \text{Ph}_2\text{NNHC}_6\text{H}_4\text{OH} \xrightarrow{\text{H}_2} \text{Ph}_2\text{NNHC}_6\text{H}_4\text{OME}$  was carried out as far as the leuco compd. stage but the methylation of the latter could not be effected. Finally, however, from  $\text{Ph}_2\text{NNH}_2$  and 2,4,6-( $\text{O}_2\text{N}$ ) $_3$ - $\text{C}_6\text{H}_2\text{Cl}$  was obtained  $\alpha, \alpha'$ -diphenyl- $\beta$ -2,4,6-trinitrophenylhydrazine (A), which is converted by  $\text{PbO}_2$  with extraordinary ease into the completely monomol.  $\alpha, \alpha'$ -diphenyl- $\beta$ -trinitrophenylhydrazyl (B), which differs from other known derivs. of bivalent N in its great stability so that its monomol. nature can easily be shown in solns. by mol. wt. detns. Even in  $\text{Et}_2\text{O-CO}_2$ , these solns. show no lightening in color, indicating that the dissociation is not altered at this low temp. The structure of B is proven by its reduction with  $\text{SnCl}_2$  in  $\text{Et}_2\text{O}$  to  $\text{Ph}_2\text{NH}$  and 1,2,4,6- $\text{C}_6\text{H}_2(\text{NH}_2)_4$ . Although it is quite stable in solns., it is very reactive, converting quinol into quinone and being itself re-



duced to **A**; the color change is so sharp that solns. of **B** can be titrated with quinol, and moreover the quinone formed can then be titrated by Willstätter's method. Halogens react instantly with **B**; in  $\text{CHCl}_3$  it takes up 1 atom Br but under the conditions of the expt. the Br in the expected product  $\text{Ph}_2\text{NNBrC}_6\text{H}_2(\text{NO}_2)_3$  migrates with formation of a compound  $\text{Ph}(\text{BrC}_6\text{H}_4)\text{NNHC}_6\text{H}_2(\text{NO}_2)_3$  (**C**). Contrary to other bivalent N radicals, **B** does not combine with NO; treated with  $\text{Ph}_2\text{NNPh}_2$  in boiling PhMe (at which temp. the  $\text{Ph}_2\text{NNPh}_2$  just begins to dissociate into  $\text{Ph}_2\text{N}$ ), it uses up 0.5 mol. of  $\text{Ph}_2\text{NNPh}_2$ , as can easily be followed by the disappearance of the color, but instead of giving the expected addition product of the 2 radicals the **B** is hydrogenated to **A** and converts the  $\text{Ph}_2\text{NNPh}_2$  into diphenyldihydrophenazine; it similarly dehydrogenates phenols and amines. The product of the action of  $\text{Ph}_3\text{C}$  on **B** has the compn. of the expected addition product but the  $\text{Ph}_3\text{C}$  group must have migrated and the product probably has the structure  $\text{Ph}(\text{Ph}_3\text{CC}_6\text{H}_4)\text{NNHC}_6\text{H}_2(\text{NO}_2)_3$  (**D**), for it can again be oxidized to a violet radical. The  $\text{Ph}_3\text{C}$  must also be dehydrogenated to some extent, for a considerable amt. of the **B** is converted into **A**. When a soln. of **B** is treated with  $\text{NO}_2$ , it becomes yellow but on evapn. *in vacuo* yields a compound (**E**) which is free from  $\text{NO}_2$  and is apparently a hydroxyhydrazine  $\text{Ph}_2\text{NN}(\text{OH})\text{C}_6\text{H}_2(\text{NO}_2)_3$ , for it is an acid, dissolves in carbonates with red color, gives neither  $\text{Ph}_2\text{NH}$ ,  $p\text{-HOC}_6\text{H}_4\text{NHNH}$  nor  $\text{C}_6\text{H}_2(\text{NH}_2)_4$  but apparently cyclic substances with  $\text{SnCl}_2$  and on oxidation gives a substance (**F**) sol. with cherry-red color, which reacts only slowly with Br and is probably a 4-valent N radical  $\text{Ph}_2\text{NN}(\cdot\text{O})\text{C}_6\text{H}_2(\text{NO}_2)_3$ . **B** becomes colorless on standing in the air with formation of **A**. The observations recorded in this and the preceding papers show that, in the field of the hydrazyls at least, the greater or lesser tendency to dissociate into radicals is connected with no known satn. of affinities by residues, nor do these hydrazyls obey the rules which Wieland has established for the dissociation of the tetraarylhydrazines. *Benzoquinone diphenylhydrazone* (1 g. from 1.84 g.  $\text{Ph}_2\text{NNH}_2$  in 10 cc. cold  $\text{AcOH}$  and 1 cc.  $\text{AcOH}$  slowly treated with 1.08 g. quinone in 15 cc.  $\text{AcOEt}$ , allowed to stand overnight, filtered from the quinhydrone, washed with  $\text{H}_2\text{O}$ ,  $\text{Na}_2\text{CO}_3$  and again  $\text{H}_2\text{O}$ , dried with  $\text{Na}_2\text{SO}_4$  and concd. on the  $\text{H}_2\text{O}$  bath), plates with blue-red surface luster from alc. or  $\text{C}_6\text{H}_6$ , m.  $136^\circ$ , reduced by  $\text{SnCl}_2$  and  $\text{HCl}$  to  $\text{Ph}_2\text{NH}$  and  $p\text{-H}_2\text{NC}_6\text{H}_4\text{OH}$ ; satd. in alc. suspension with  $\text{NH}_3$ , then treated with  $\text{H}_2\text{S}$  until it dissolves and becomes colorless and finally pptd. with  $\text{H}_2\text{O}$  it yields the *leuco compound*, needles, quite stable, when dry, in the air, quickly oxidized back to the hydrazone in soln., especially in alc. and in the presence of alkali, cannot be acetylated with  $\text{Ac}_2\text{O}$  or methylated with  $\text{CH}_3\text{N}_3$ ,  $\text{Me}_2\text{SO}_4$  or  $\text{MeI}$ . **A** (3.7 g. from 3.68 g.  $\text{Ph}_2\text{NNH}_2$  and 2.84 g. picryl chloride in  $\text{CHCl}_3$ ), long yellow-red prisms from  $\text{AcOH}$  or  $\text{AcOH}$ , m.  $172\text{--}3^\circ$  (decompn.), unchanged by glacial  $\text{AcOH}$  or by  $\text{HCl}$  in  $\text{Et}_2\text{O}$ , decompd. by concd.  $\text{H}_2\text{SO}_4$ , dissolving with greenish color which on standing changes to blue-green and on diln. with  $\text{H}_2\text{O}$  disappears with sepn. of brown flocks; the yellow-red alc. solns. are turned brown-black, with salt formation, by alkalis,  $\text{NH}_3$  and  $\text{Na}_2\text{CO}_3$ , acids repptg. unchanged **A**; **A** is not changed in boiling PhMe but the  $\text{BzOEt}$  soln. rapidly becomes blue-red (radical formation) on boiling, longer boiling producing decompn. and a brown color. **B** (5.6 g. from 6 g. **A** in 90 cc.  $\text{CHCl}_3$  shaken 1 hr. with 70 g.  $\text{PbO}_2$  and 5 g. ignited  $\text{Na}_2\text{SO}_4$ , filtered, concd. *in vacuo* and treated with 2 vols.  $\text{Et}_2\text{O}$ ), long violet-black prisms, sol. in all solvents with a  $\text{KMnO}_4$ -like violet color, can be boiled 7–8 min. in PhMe without visible change, begins to decomp. noticeably in boiling xylene in 5 min. and in  $\text{BzOEt}$  in 1–2 min.; when the decompn. is complete the soln. assumes the yellow-red color of **A**; the  $\text{AcOH}$  soln. is stable a long time in the cold but quickly becomes red-brown on heating; in  $\text{H}_2\text{SO}_4$  it dissolves like **A**;  $\text{HCl}$  in  $\text{Et}_2\text{O}$  decolorizes it almost instantly; alkalis and  $\text{NH}_3$  turn alc. solns. dark brown like those of **A**;  $\text{Et}_2\text{O}$  solns. in sunlight change in 3 days through dirty red to red-yellow; in diffuse light they are stable for 5 weeks; the in-

solated solns. yield **A** on evapn. Mol. wt. of **B** in freezing  $\text{PhNO}_2$ , 333–6 (304, 286, 256 after 1, 3 and 4 days); calcd. 394. **C**, hair-like needles from  $\text{CHCl}_3$ , m. 179–80° (decompn.), reduced by  $\text{SnCl}_4$  in  $\text{Et}_2\text{O}$  to  $\text{C}_6\text{H}_2(\text{NH}_2)_4$  and a compound  $\text{C}_{12}\text{H}_{16}\text{NBr}$ , needles from 80%  $\text{MeOH}$ , m. 64°, gives a blue color like  $\text{Ph}_2\text{NH}$  with concd.  $\text{H}_2\text{SO}_4$  and  $\text{NaNO}_2$ . **E**, red spears with blue to blue-black surface luster from  $\text{AcOEt-EtOH}$  (2:3), m. 156–7° (decompn.), seps. from  $\text{AcOH}$  with solvent of crystn., is colored by concd.  $\text{H}_2\text{SO}_4$  yellow, then olive-green and finally brown-red; 1 g. in  $\text{CHCl}_3$  with  $\text{PbO}_2$  gives 0.9 g. **F**, short black-green prisms with metallic luster from  $\text{AcOEt}$ , m. 198° (decompn.), decolorized by quinol and by acidified  $\text{KI}$ . From 6 g.  $\text{Ph}_3\text{C}$  in 60 cc.  $\text{C}_6\text{H}_6$  under  $\text{CO}_2$  treated in the course of 45 min. with 8.2 g. **B** in 250 cc.  $\text{C}_6\text{H}_6$  are obtained 3 g. **A** and **D**, red-brown powder of short yellow-red microprisms from  $\text{AcOEt}$  + 2 vols.  $\text{EtOH-Et}_2\text{O}$  (9:1), m. 182–3° (decompn.); alc. solns. are colored brown-black by alkalis, acids restoring the yellow-red color; concd.  $\text{H}_2\text{SO}_4$  gives a yellow, then an olive-green color changing to blue-green on standing. **V. Action of tetranitromethane on triphenylhydrazine.** STEFAN GOLDSCHMIDT AND KONRAD RENN. *Ibid* 644–7.—When 2.6 g.  $\text{Ph}_2\text{NNHPh}$  in 100 cc. cold  $\text{Et}_2\text{O}$  is slowly treated with 1.96 g.  $\text{C}(\text{NO}_2)_4$  in  $\text{Et}_2\text{O}$  and allowed to stand several hrs., protected from the air, there is obtained 3 g. of a compound, apparently  $\text{Ph}_2\text{NN:C}_6\text{H}_4\text{:C}(\text{NO}_2)_2$  (**A**), blue-green leaflets from  $\text{CHCl}_3\text{-Et}_2\text{O}$  (1:6), decomp. suddenly 107° (evolution of N oxides), difficultly sol. in  $\text{Et}_2\text{O}$  with violet-blue, easily in other solvents with bright corn flower-blue color; its solns. are turned yellow by  $\text{HCl}$  in  $\text{Et}_2\text{O}$  but not by  $\text{AcOH}$ ; alkalis turn the yellow solns. blue again; concd.  $\text{HCl}$  or  $\text{H}_2\text{SO}_4$  produces a yellow color which disappears on short standing, with sepn. of a brown-black powder; alc.  $\text{KOH}$  turns **A** yellow with complete decompn.;  $\text{Zn}$  dust and  $\text{AcOH}$  in alc. or  $\text{Et}_2\text{O}$  decolorize it; mol. wt. in freezing  $\text{C}_6\text{H}_6$  358; **A** liberates 2 atoms of  $\text{I}$  from acidified  $\text{KI}$ . *Leuco compound* (from 2 g. **A** in 125 cc.  $\text{Et}_2\text{O}$  shaken with 8 g.  $\text{Zn}$  dust and 1.5 g.  $\text{AcOH}$  until the soln. is colorless), crystals becoming faintly green on the surface, darken 75° (in a capillary filled with  $\text{CO}_2$ ), m. 85° (evolution of N oxides), regenerate **A** in the air, instantly on addition of  $\text{PbO}_2$ . **A** (3 g.) in 200 cc.  $\text{Et}_2\text{O}$  slowly treated with 30 g.  $\text{SnCl}_2$  in 150 cc.  $\text{Et}_2\text{O}$  and 9 g.  $\text{HCl}$  gas gives, besides  $\text{Ph}_2\text{NH}$ , a compound, apparently  $\text{Ph}_2\text{NNHC}_6\text{H}_4\text{CH:NOH}$ , yellow crystals from  $\text{C}_6\text{H}_6$ , m. 175°, sol. in dil.  $\text{HCl}$ , the soln. becoming violet and depositing flocks on heating; mol. wt. in  $\text{C}_6\text{H}_6\text{N}$  by the Barger-Rast method, less than 337 and more than 240. C. A. R.

**Organo-derivatives of tin and lead. I. Application of lead and tin tetraphenyls in the preparation of organo-metallic compounds.** A. E. GODDARD, J. N. ASHLEY AND R. B. EVANS. *J. Chem. Soc.* 121, 978–82 (1922).— $\text{PbPh}_4$  and  $\text{AsCl}_3$  react to form  $\text{Ph}_2\text{AsCl}$  in 91% yield. Similarly  $\text{SbCl}_3$  yields  $\text{Ph}_2\text{SbCl}$  and  $\text{SbCl}_5$   $\text{Ph}_2\text{SbCl}_3$ , while  $\text{BiBr}_3$  gives  $\text{Ph}_2\text{BiBr}$ . Of the chlorides of group VI, only  $\text{TeCl}_4$  yielded definite products,  $\text{Ph}_2\text{TeCl}_2$  being obtained. The reaction of  $\text{SnCl}_4$  and  $\text{PbPh}_4$  and subsequent treatment with  $\text{H}_2\text{O}$  gave  $\text{Ph}_2\text{PbCl}_2$ ,  $\text{Ph}_2\text{SnClOH}$  and  $\text{Ph}_2\text{Sn}(\text{OH})_2$ . The action of  $\text{SnCl}_4$  on  $\text{SnPh}_4$  gave a theoretical yield of  $\text{Ph}_2\text{SnClOH}$ .  $\text{SnCl}_2$  and  $\text{PbPh}_4$  gave the same products as  $\text{SnCl}_4$ . No reaction was observed with  $\text{PCl}_3$ ,  $\text{PCl}_5$ ,  $\text{HgCl}_2$ ,  $\text{PbCl}_4$ ,  $\text{SOCl}_2$  or  $\text{AcCl}$  and  $\text{PbPh}_4$  nor with  $\text{SnPh}_4$  and  $\text{HgCl}_2$  or  $\text{SOCl}_2$ . The action of  $\text{EtCO}_2\text{H}$  on  $\text{PbPh}_4$  in xylene gives *acid leaddiphenyl propionate*, fine needles, m. 168–9° and decomp. 230–5°. *Lead-diphenyl valerate*, needles, m. 168–70°. *Acid leaddiphenyl trichloroacetate*, powder, softens 170–5°, decomp. 210°. *Leaddiphenyl oxalate*, powder, decomp. 293–5°. *Iodate*, buff-colored powder, does not m. 300°, explodes when treated with concd.  $\text{H}_2\text{SO}_4$  with liberation of  $\text{I}$ . *p-Nitrobenzoate*, small, pale yellow needles, m. 256°. Similar products could not be obtained with  $\text{SnPh}_4$ . C. J. WEST

**The sulfilmines, a new class of organic compounds containing quadrivalent sulfur.** FREDERICK GEORGE MANN AND WM. JACKSON POPE. *J. Chem. Soc.* 121, 1052–5

(1922).—*Methylethylsulfine-p-toluenesulfonylimine*,  $\text{MeEtS}:\text{NSO}_2\text{C}_6\text{H}_4\text{Me}$ , prep'd. by shaking  $\text{MeEtS}$  with a cold conc'd. aq. chloroamine T (A), fine needles, m.  $133^\circ$ . *Diethyl derivative*, small plates, m.  $144^\circ$ .  $\beta,\beta'$ -*Dichlorodiethyl derivative*, from "mustard gas" and A, fine needles, m.  $144.5^\circ$  (first prep'd. by Raper, British C. W. S.), is useful in characterizing the sulfide. *Dibenzyl derivative*, needles, m.  $193^\circ$ . *Diethyldisulfine-bis-p-toluenesulfonylimine*, from  $(\text{C}_6\text{H}_5)_2\text{S}_2$  and A, powder from  $\text{CHCl}_3$ , darkens  $165^\circ$ , decomps.  $200^\circ$ . The higher Cl derivs. of  $\text{Et}_2\text{S}$  do not react in this way, perhaps because they are too feebly basic.  $\text{Ph}_3\text{As}$  reacts with A to give a double comp'd. of 2 mols. of triphenylarsine-p-toluenesulfonylimine with 1 mol. of p-toluenesulfonamide, long needles, m.  $176.5^\circ$ . No condensation product could be obtained with  $\text{PhNMe}_2$  or  $\beta$ -thiotole. C. J. WAST

**Mercury compounds of hydroxybenzaldehydes.** T. A. HENRY AND T. M. SHARP. *J. Chem. Soc.* 121, 1055-60(1922).—When  $\text{BzH}$  is heated with  $\text{Hg}(\text{OAc})_2$ , only  $\text{HgOAc}$  can be isolated but with HO aldehydes Hg compds. are formed in which either 1 or 2- $\text{HgOAc}$  residues become attached to the C atoms in the ring. These are prep'd. by boiling 1 mol. of the aldehyde in 50% alc. with 1 or 2 mols. of  $\text{Hg}(\text{OAc})_2$  in 50% alc. contg. 1%  $\text{AcOH}$ . 3,5-Diacetoxydimercurysalicylaldehyde, obtained in 68.5% yield, forms minute, distorted cubes, and m.  $133^\circ$  (decompn.). Dissolved in  $\text{NaOH}$  and treated with  $\text{CO}_2$ , 3,5-dihydroxydimercurysalicylaldehyde results, yellow, does not m.  $300^\circ$ . With  $\text{HCl}$ , the  $\text{NaOH}$  soln. gives the 3,5-dichloro derivative, does not m.  $310^\circ$ . I in KI gives 3,5- $\text{I}_2\text{C}_6\text{H}_3(\text{OH})\text{CHO}$ , which establishes the constitution. 4,5-Anhydro-3-acetoxymercuri-5-hydroxymercuri-4-hydroxybenzaldehyde,  $\text{OHC}(\text{AcOHg})\text{C}_6\text{H}_3\text{HgO}$ , minute

cubes with no definite m. p. Hot  $\text{AcOH}$  gives 3,5-diacetoxydimercuri-4-hydroxybenzaldehyde, minute glistening plates, does not m.  $300^\circ$ . The dihydroxy derivative is dull gray. The constitution was established by transformation by I-KI, into 3,5- $\text{I}_2\text{C}_6\text{H}_3(\text{OH})\text{CHO}$ , m.  $206.5^\circ$  (Paal, *Ber.* 28, 2412, gives  $198-9^\circ$ ), and its oxidation to  $\text{AcH}$ , m.  $261^\circ$  (not  $237^\circ$ ). Acetoxymercuri-m-hydroxybenzaldehyde, needles, m.  $185-6^\circ$ , which is decomp'd. by I-KI into an iodo-m-hydroxybenzaldehyde, yellow needles, m.  $159-60^\circ$ , and possessing powerful sternutatory properties. The corresponding acid m.  $223^\circ$ ; its constitution is being investigated. C. J. WAST

**Organic mercury compounds prepared from o-chloromercuri-p-nitrobenzoyl chloride.** F. C. WHITMORE AND E. B. MIDDLETON. *J. Am. Chem. Soc.* 44, 1546-51 (1922).—The inner anhydride (A) of 2,4- $\text{HOHg}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{CO}_2\text{H}$  suspended in  $\text{CHCl}_3$  gives with  $\text{PCl}_5$  the chloride  $\text{ClHg}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{COCl}$ , which it is difficult to obtain pure enough for analysis. The crude chloride treated with alics. and ethylenechlorhydrins yields the corresponding esters and with  $\text{PhNH}_2$  gives the anilide. With KI the esters react according to the equation  $\text{ClHg}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{CO}_2\text{R} + 4\text{KI} = \text{Hg}[\text{C}_6\text{H}_3(\text{NO}_2)_2\text{CO}_2\text{R}]_2 + \text{K}_2\text{HgI}_4 + 2\text{KCl}$ . The resulting  $\text{HgPh}_2$  derivs. are less sol. than the corresponding chlorides, react in the usual way with  $\text{HgCl}_2$ , forming compds. of the type  $\text{RHgCl}$ , can be sapon'd. without breaking the C-Hg union, yielding  $[2,4\text{-HO}_2\text{C}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{Hg}]_2$ . Butyl o-chloromercuri-p-nitrobenzoate (B) (9 g. from 10 g. crude A), m.  $125-6^\circ$ . Propyl ester, m.  $145-50^\circ$ . Isopropyl ester, m.  $179-80^\circ$ . Ethyl ester, m.  $220-2^\circ$ . Methyl ester, m.  $240-5^\circ$ . Chloroethyl ester, m.  $163-4^\circ$ . No homogeneous products could be obtained with  $\text{BrCH}_2\text{CH}_2\text{OH}$  and  $\text{Et}_3\text{NCH}_2\text{CH}_2\text{OH}$ . The esters with cold Br water gave products which, after sapon. and acidification, yielded 2,4- $\text{Br}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{CO}_2\text{H}$ . o-Chloromercuri-p-nitrobenzanilide, crystals from  $\text{EtOH}$ . Dibutyl o-mercuribis-p-nitrobenzoate (5 g. from 8 g. of B refluxed 1 hr. in alc. with 5 g. KI), m.  $158^\circ$ ; 1 g. heated 30 min. in alc. with 1 mol.  $\text{HgCl}_2$  gives 1.2 g. B. Propyl ester (yield, 92%), m.  $189^\circ$ . Ethyl ester, m.  $227-32^\circ$ . Butyl o-chloromercuribenzoate, m.  $115^\circ$ . C. A. R.

Certain dialkylbenzyl cyanides and the corresponding alcohols, amids, amines and acids. JOSEPH BLONDRAU. *Compt. rend.* 174, 1424-6(1922).—2-methyl-2-phenyl-

butane nitrile (A), obtained by treating  $\text{PhCHEtCN}$  with  $\text{NaNH}_2$  and  $\text{MeI}$ , b.  $239^\circ$ ,  $b_{11}$   $119-20^\circ$ . The methylation must be complete since the two nitriles boil at the same temp. 2-Phenyl-2-phenylbutane nitrile (B), obtained in a similar manner,  $b_{11}$   $201^\circ$ . A and B treated with 85%  $\text{H}_2\text{SO}_4$  at  $100^\circ$  give, resp., 2-methyl-2-phenylbutyramide (C), white needles, very sol. in org. solvents, m.  $74^\circ$ , and 2-methyl-2-benzylbutyramide (D), slightly sol. in org. solvents, m.  $119^\circ$ . Complete hydrolysis of A gives 2-methyl-2-phenylbutyric acid, very sol. inorg. solvents, m.  $60^\circ$ . The Me ester, obtained by satg. a soln. in  $\text{MeOH}$  with  $\text{HCl}$ ,  $b_{11}$   $120^\circ$ . The Et ester  $b_{11}$   $124-5^\circ$ . 2-Phenyl-2-benzylbutyric acid, obtained quant. by heating D in  $\text{AcOH}$  with  $\text{HCl}$  in a sealed tube, m.  $140^\circ$ . The Me ester, obtained through the acyl chloride, m.  $61^\circ$ ,  $b_{11}$   $196-7^\circ$ . 2-Ethyl-2-phenylbutanol, obtained in 45-50% yield by reducing  $\text{PhCEtCONH}_2$  (E) with Na, b.  $260-1^\circ$ ,  $b_{11}$   $136-7^\circ$ . The Bz deriv. obtained with  $\text{BzCl}$  and pyridine  $b_{11}$   $210^\circ$ . The phenylurethan, white needles, m.  $70^\circ$ . 2-Methyl-2-phenylbutanol obtained in 55% yield by reduction of C with Na, b.  $246^\circ$ ,  $b_{11}$   $138^\circ$ . The Bz deriv. m.  $46^\circ$ ,  $b_{11}$   $202-4^\circ$ . The phenylurethan is an extremely viscous liquid. 2-Phenyl-2-benzylbutanol, obtained in 83% yield from D,  $b_{11}$   $211^\circ$ . The Bz deriv. is not cryst. The phenylurethan, small needles, m.  $117^\circ$ . 2-Ethyl-2-phenylbutaneamine (F), formed in small quantities in the reduction of E, obtained by the reduction of  $\text{PhCEtCN}$  by Na in abs.  $\text{EtOH}$ , is a colorless pleasant smelling liquid rapidly absorbing  $\text{CO}_2$  from the air,  $b_{11}$   $137-9^\circ$ . The  $\text{HCl}$  salt, obtained by passing  $\text{HCl}$  gas into the  $\text{Et}_2\text{O}$  soln., can be crystd. from abs.  $\text{EtOH}$ . 2-Methyl-2-phenylbutaneamine, obtained in 2.5% yield in the reduction of C,  $b_{11}$   $112-3^\circ$ ; its properties resemble those of F. 2-Phenyl-2-benzylbutaneamine, obtained in 4% yield by reduction of D, resembles F,  $b_{11}$   $193^\circ$ . T. E. DUNLAP

Aldehydosalicylic acids and their derivatives. E. J. WAYNE AND J. B. COHEN. *J. Chem. Soc.*, 121, 1022-9 (1922).—Tiemann and Reimer (*Ber.* 9, 1268) prepd. 2 acids, o- and p-aldehydosalicylic acids, termed in this work the 3- and 5-acids. The 5-acid is the chief product. Methyl ester of 5-acid (A), pale buff needles, m.  $78^\circ$ , or colorless through the  $\text{NaHSO}_4$  compd., m.  $82-3^\circ$ . Ethyl ester, m.  $75^\circ$ . Methyl ester of the 3-acid, needles, m.  $87^\circ$ . Methyl 2-methoxy-5-aldehydobenzoate, by the action of  $\text{Me}_2\text{SO}_4$  upon A, silky needles, m.  $86-7^\circ$ . Phenylhydrazone, pale yellow needles, m.  $133-5^\circ$ ; nitrophenylhydrazone, dark red needles from  $\text{C}_6\text{H}_5\text{N}$ , m.  $200^\circ$ ; oxime, needles, m.  $145-7^\circ$ ; semicarbazone, small rectangular plates, m.  $190^\circ$ . The free acid forms long needles, m.  $170^\circ$ . Benzoate of A, prisms with pointed ends, m.  $99-101^\circ$ . Acetate, needles, m.  $81-2^\circ$ . 3-Bromo derivative of A (?), needles, m.  $115-6^\circ$ ; phenylhydrazone, greenish yellow needles, m.  $155-7^\circ$ . Mononitro derivative, by the action of fuming  $\text{HNO}_3$  and concd.  $\text{H}_2\text{SO}_4$  upon A, glistening plates from  $\text{C}_6\text{H}_4$  or  $\text{AcOEt}$ , m.  $161-3^\circ$ . Sodium compound, clusters of orange needles. The yellow color in  $\text{C}_6\text{H}_5\text{N}$  indicates the formation of a salt. Dinetro derivative, m.  $128-30^\circ$ . The action of fuming  $\text{HNO}_3$  at  $0-5^\circ$  on the 5-acid gives  $(\text{O}_2\text{N})_2\text{C}_6\text{H}_3(\text{OH})\text{CO}_2\text{H}$  (*Ann.* 195, 47). The oxime of A forms clusters of needles, m.  $147-8^\circ$ ; hydrazone, needles, m.  $139-40^\circ$ , has the formula  $[\text{MeO}_2\text{C}(\text{HO})\text{C}_6\text{H}_3\text{CH}_2\text{N}]_2$ ; semicarbazone, small prisms with pointed ends from  $\text{C}_6\text{H}_5\text{N}$ , m.  $215-6^\circ$ ; if crystd. from  $\text{AcOH}$ , the acetate is formed; phenylhydrazone, pale yellow aggregates of blunt prisms, m.  $120-1^\circ$ ; nitrophenylhydrazone, dark red, flat prisms with pointed ends, m.  $265-7^\circ$ . With  $\text{Ac}_2\text{CH}_2$  a condensation product,  $\text{C}_{14}\text{H}_{11}\text{O}_6$ , was formed, brown, m.  $94-5^\circ$ . Methyl sodium 5-aldehydosalicylate, straw-colored, slightly sol. in alc., insol. in  $\text{Et}_2\text{O}$ . The action of  $\text{Ac}_2\text{O}$  and  $\text{AcONa}$  gave 4-hydroxy-5-carboxycinnamic acid, straw-colored powder. The sodium salt of the 3-acid gives 2-hydroxy-3-carboxycinnamic acid, which decomps. on heating with the formation of coumarin. C. J. W&SR

Condensation of methyl 2-hydroxy-3-naphthoate with methyl n-opianate. KARL SROSROS. *Monatsh.* 43, 43-7 (1922).—Methyl n-opianate, from the Ag salt and  $\text{MeI}$ , rhombic prisms, m.  $82^\circ$ . Condensed with  $\text{HBr}$ , 1-opianic-2-hydroxy-3-naphthoic acid

is formed, pale yellow, m. 193.5°. *Sodium salt*, fine glistening needles, which are very hygroscopic. *Methyl ester*, from the Na salt and  $\text{Me}_2\text{SO}_4$ , pale yellow, m. 164°. 100 parts dry  $\text{Et}_2\text{O}$  dissolve 0.2133 part opianic acid.

C. J. WEST

**Reactivity of doubly conjugated unsaturated ketones. III. Unsymmetrical hydroxy and methoxy derivatives.** J. S. BUCK AND I. M. HEILBRON. *J. Chem. Soc.* 121, 1095-1101(1922); cf. *C. A.* 16, 90.—In the study of the condensation of  $o\text{-HOC}_6\text{H}_4\text{CH:CHCOMe}$  (A) with substituted  $\text{BzH}$ , it has been observed that those derivs. containing a  $p\text{-HO}$  group did not condense. This is believed to be due to the instability of the resulting products in the presence of alkali and not to any peculiar property of the HO aldehydes themselves. *3',2-Dihydroxydistyryl ketone*, from A and  $m\text{-HOC}_6\text{H}_4\text{CHO}$ , yellowish green powder with  $11\text{H}_2\text{O}$ , m. 137°; *dibenzoate*, pale yellow prisms, m. 112-3°. *2'-Methoxy-2-hydroxydistyryl ketone*, from  $o\text{-MeOC}_6\text{H}_4\text{CHO}$ , pale, apple-green crystals, m. 129°. *Sodium salt*, dull red. *3-Methoxy-2-hydroxydistyryl ketone*, obtained in small yields from  $m\text{-MeOC}_6\text{H}_4\text{CHO}$ , small, canary-yellow nodules, m. 128°. *4'-Methoxy-2-hydroxydistyryl ketone*, small, yellow needles, m. 139°. *p-Dimethylaminobenzaldehyde addition product*, lemon-yellow prisms, m. 91-2°. *m-Dinitrobenzene addition product*, orange powder, m. 117°. *3',4'-Dimethoxy-2-hydroxydistyryl ketone*, apple-green rhombs, m. 140-1°; *sodium salt*, brilliant red needles. *3',4'-Methylenedioxy-2-hydroxydistyryl ketone*, golden yellow needles, m. 170-1°. *2-Hydroxystyryl furfurylideneethyl ketone*, bright yellow, glistening prisms, m. 162-3°. In an attempt to condense  $2,5\text{-(HO)}_2\text{-C}_6\text{H}_3\text{CHO}$ , A was recovered in the form of colorless prisms, m. at the same temp. as the ordinary yellow form but exhibiting very marked differences in behavior. *p-Hydroxystyryl methyl ketone* (*Ber.* 36, 134) is conveniently prepd. by condensing  $p\text{-HOC}_6\text{H}_4\text{CHO}$  and  $\text{AcMe}$  with 2 mols.  $\text{NaOH}$ , m. 114-5° (not 102-3°). C. J. WEST

**p-Hydroxybenzoyl-o-benzoic acid and some of its derivatives.** W. R. ORNDORFF AND L. KELLEY. *J. Am. Chem. Soc.* 44, 1518-27(1922); cf. *C. A.* 11, 1828.—*o*-( $p\text{-HOC}_6\text{H}_4\text{CO})\text{C}_6\text{H}_4\text{CO}_2\text{H}$  (A), obtained in 75 g. yield from 100 g. phenolphthalein by Friedländer's method, seps. from  $\text{H}_2\text{O}$  in plates, usually diamond-shaped, sol. in cold 5%  $\text{NaOH}$  with pale yellow, in cold concd.  $\text{H}_2\text{SO}_4$  with bright yellow color, m. 213° (gas evolution), dissolves in the following parts of solvent at 21°:  $\text{H}_2\text{O}$  1578.8, 95% alc. 2.28,  $\text{MeOH}$  6.83,  $\text{C}_6\text{H}_6$  7193.2, absorbs 2.5 mols. dry  $\text{NH}_3$ , becoming pale yellow, the product slowly losing 1.5 mols. of the  $\text{NH}_3$  in *vacuo* over  $\text{H}_2\text{SO}_4$ , leaving a slightly yellow mono- $\text{NH}_4$  salt. *Monosodium salt*, from 5 g. A in 25 cc. abs. alc. and 0.5 g. Na in 30 cc. alc., needles with 1  $\text{EtOH}$ , becomes yellow at 110-20° but takes up  $\text{H}_2\text{O}$  in the air and soon becomes colorless again. *Silver salt*, from A in alc. and aq. alc.  $\text{AgNO}_3$ , heated 2 hrs., grayish crystals depositing metallic Ag when crystd. from  $\text{H}_2\text{O}$ . *Barium salt*, from A in  $\text{H}_2\text{O}$  heated 3 hrs. with  $\text{BaCO}_3$ , 6-sided greenish yellow crystals with 2  $\text{H}_2\text{O}$ , softens 245°, m. 259° (gas evolution). *Calcium salt*, pale yellow needles with 2  $\text{H}_2\text{O}$ , softens 252°, m. 262-3° (gas evolution). *Zinc salt*, plates with 7.5  $\text{H}_2\text{O}$ , m. 80-1°. *Diacetate*, from A boiled 2 hrs. with 6 parts  $\text{Ac}_2\text{O}$  or with 1 part  $\text{NaOAc}$  and 8 parts  $\text{Ac}_2\text{O}$ , m. 162-3°. *Ethyl ester*, from A in 95% alc. boiled with concd.  $\text{H}_2\text{SO}_4$ , needles from  $\text{H}_2\text{O}$ , m. 114-5°, rapidly absorbs 1 mol. dry  $\text{NH}_3$ , turning lemon-yellow and finally forming a greenish yellow gummy mass which loses part of its  $\text{NH}_3$  in *vacuo* over  $\text{H}_2\text{SO}_4$ . *Methyl ester*, needles from  $\text{H}_2\text{O}$ , m. 149-50°, absorbs more than 1 but less than 1.5 mols.  $\text{NH}_3$ , becoming greenish yellow and semi-liquid. *3,5-Dibromo-4-hydroxybenzoyl-o-benzoic acid*, from tetrabromophenolphthalein oxime and boiling dil.  $\text{H}_2\text{SO}_4$ , m. 246-8°, or from A in  $\text{AcOH}$  and 2.1 mols. Br, m. 250°. *Phenylthiozone* of A, from 10 g. A and 9 g.  $\text{PhNHNH}_2$  heated 3 hrs. at 160°, needles from 95% alc., m. 267-8°. *Hydroxyphenylphthalide*, from A in 95% alc. boiled 2.5 hrs. with Zn and concd.  $\text{HCl}$ , needles from  $\text{EtOH-H}_2\text{O}$ , m. 164-5° (Meyer, *Monaish.* 20, 363(1899), gives 157-60°); acetate, needles from 95% alc., m. 125-6°. *o*-( $p\text{-MeOC}_6\text{H}_4\text{CO})\text{C}_6\text{H}_4\text{CO}_2\text{H}$ ,

from  $C_6H_4(CO)_2O$  and PhOMe at  $-5^\circ$  to  $-10^\circ$  treated slowly with  $AlCl_3$  and finally heated to  $55^\circ$ , m.  $141.5-2.0^\circ$ , or from A in NaOH boiled 2.5 hrs. with  $Me_2SO_4$ , m.  $144-5^\circ$ , absorbs 1.5 mols. dry  $NH_3$ , becoming faintly yellow and losing 0.5 mol. of the  $NH_3$  in *vacuo* over  $H_2SO_4$  and more of it when heated 3 hrs. at  $65^\circ$  in dry air; *monosodium salt*, needles from alc.; *potassium salt*, long needles with 0.5 EtOH, m.  $257^\circ$ . In NaOH with  $Me_2SO_4$  the acid yielded the Me ester, m.  $80-1.5^\circ$ , obtained by Meyer and Turnau through the chloride (prepd. with  $SOCl_2$ ); they give  $84^\circ$  as the m. p.

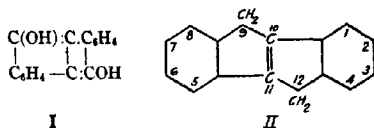
C. A. R.

**Role of mercuric nitrate in the "catalyzed" nitration of aromatic substances. II. Nitration of naphthalene.** T. L. DAVIS. *J. Am. Chem. Soc.* **44**, 1588-91 (1922); cf. *C. A.* **15**, 1531.—The nitration of  $C_{10}H_8$  in the presence of  $Hg(NO_3)_2$  gives, in addition to the products of simple nitration, nitro- $\alpha$ -naphthols instead of the nitro- $\beta$ -naphthols, as might have been expected. Unlike the reaction with  $C_6H_6$ , there is no deepening in color or any other evidence of the formation of an intermediate compd. The amt. of nitronaphthols formed is exceedingly small; the most favorable conditions are moderately dil. acid and moderately low temps. The best yield was obtained by stirring 1 mol.  $C_{10}H_8$  at  $35^\circ$  for 37 hrs. with 1 l. of a soln. containing 600 cc. of  $HNO_3$  (d. 1.35) and 1 mol.  $Hg(NO_3)_2$ ; this gave 55 g. crude product consisting largely of 1,2,4- $C_{10}H_5(OH)(NO_2)_2$  and a small amt. of a substance having the properties of 1,2- $C_{10}H_5(OH)NO_2$ , which has not been positively identified.

C. A. R.

**Compounds of the diphen succindene series. IV. 9,12-Dichlorodiphen succinda-9,11-diene and 10-diphen succindene.** K. BRAND AND K. O. MÜLLER. *Ber.* **55B**, 601-8 (1922); cf. *C. A.* **14**, 3211.—Diphen succindane-9,12-dione (A) and the 9,12-diaryldiphen succinda-9,11-dienes dissolve in alkalis with a similar orange color, whence it is quite likely that the color of the alk. solns. of A is due to a Na deriv. of the enol form of A, *viz.*, 9,12-dihydroxydiphen succinda-9,11-diene (I), the constitutional cause of the color residing in the 2 conjugated double bonds of the 2 condensed 5-membered rings lying between two  $C_6H_5$  nuclei. If such is the case, diphen succinda-9,11-diene (B), the simplest representative of this series of compds., should be colored also. Attempts, which have not yet been carried through, to prep. B have been made and in the course of the work some new interesting compds. of the diphen succindene series have been obtained. A (6 g.) and 20 g.  $PCl_5$  cautiously warmed over a free flame until reaction begins, which then proceeds without further heating, and, after cooling, extd. with a little hot dry  $C_6H_6$  yield 9,9,12,12-tetrachlorodiphen succindane, needles, m.  $135^\circ$  (decompn.), loses HCl in the air or in a desiccator with formation of 9,12-dichlorodiphen succinda-9,11-diene (C) or on soln. in alc. or boiling with  $H_2O$  with formation of A and C; when allowed to stand in  $C_6H_6$  several days with frequent shaking, it likewise goes over into C. C, obtained from the crude tetra-Cl compd. from 6 g. A treated with 5 g. NaOAc in 150-250 cc. alc. and, after the energetic reaction has ceased, dild. with more alc. and refluxed until the oily product solidifies and finally dissolves with sepn. of NaCl, long, fine, silky, red-brown needles, m.  $191^\circ$ ; mol. wt. in  $C_6H_6$  299; refluxed in alc. with several parts Zn dust and a few drops of  $HgCl_2$  soln. until it is decolorized, it gives 10-diphen succindene (II), very faintly yellowish leaflets, m.  $210^\circ$ , mol. wt. in  $C_6H_6$  189-202, sol. in concd.  $H_2SO_4$  with green color, while the alc. soln. is turned red by concd.  $H_2SO_4$ ; it adds Br but the Br deriv. immediately loses HBr; a similar reduction of C can be effected with Zn dust and AmOH or AcOH. With palladized charcoal and H in alc. and a little  $H_2O$ , II gives diphen succindane, m.  $102^\circ$ . 9,12-Dibenzylidene-10-diphen succindene (D), from 2 g. II, 4 g. BzH and 0.3 g. Na in 10 cc. alc. stirred 24 hrs., allowed to stand another 24 hrs., boiled up with alc. and  $H_2O$ , filtered, refluxed a long time in alc. to remove unchanged II and by-products, then extd. several times with hot AcOH and recrystd. repeatedly from AmOAc, cinnabar-red leaflets, m.  $244^\circ$ , mol. wt.

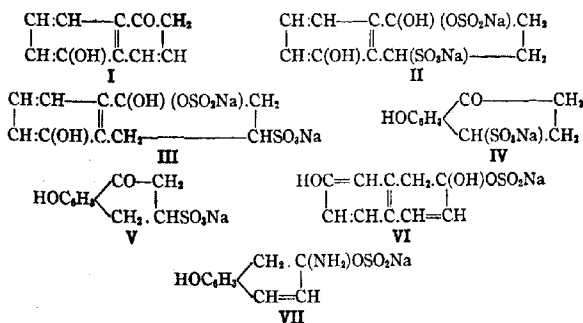
in  $C_8H_8$  349-73; immediately oxidized by  $CrO_3$ ; the alc. ext. on cooling deposits needles, m.  $155^\circ$ , apparently of the *g*-monobenzyldiene derivative. With palladinized charcoal and H in  $AcOH-EtOH$ , D gives *g*,12-dibenzylidiphensuccindane, m.  $141^\circ$ , also obtained in the same way from *g*,12-dibenzylidenediphensuccindane (E) (prepd. from 9,12-diben-



zylidiphensuccindane-9,12-diol; it will be described in detail later). Refluxed in  $AcOH$  with Zn dust until decolorized, D gives E, fine needles from  $AmOAc$ , m.  $255^\circ$ . C. A. R.

**Tautomerism of the phenols. V. 1,5- and 2,7-Dihydroxynaphthalene.** WALTER FUCHS AND WALTER STIX. *Ber.* 55B, 658-70(1922); cf. C. A. 15, 2073; Friedländer, C. A. 15, 2864.—When 1,5- $C_{10}H_8(OH)_2$  (A), monoclinic last- or column-shaped crystals from  $H_2O$ , m.  $251^\circ$ , is refluxed 30 days with a concd., freshly prepd. soln. of somewhat more than 2 mols.  $NaHSO_3$ , it adds 2 mols.  $NaHSO_3$  and yields almost quant. a compound  $C_{10}H_{10}O_8S_2Na_2$  (B), yellow cryst. powder, sol. in  $H_2O$ , insol. in org. solvents, gives in  $H_2O$  with  $FeCl_3$  a faint violet color changing on addition of a drop of 3%  $H_2O_2$  to an olive-green, which becomes brown-red when the soln. is made alk. One mol. of the added  $NaHSO_3$  is quite stable towards acids but is quant. split off in a few min. by alkali, while the 2nd mol. of the added  $NaHSO_3$  is wholly resistant towards both acids and alkalies. If A can react in the tautomeric form I, it may be assumed that in B the loosely held  $NaHSO_3$  has added to the C:O group and the other mol. at the C:C bond, i. e., that B has the structure II or III and that by loss of 1 mol. of  $NaHSO_3$ , it will give a tetralinsulfonate (IV or V). As a matter of fact such a product is formed when B is allowed to stand a short time in very dil. alkali or boiled a long time with  $H_2O$ ; it can also be obtained directly, although in somewhat poorer yield (50%) by refluxing 5 g. A with somewhat more than 2 mols.  $NaHSO_3$  in concd. soln. for 10 days (2 ppts. are formed, one yellow and granular, the other more flocculent), decanting cautiously, floating away the flocculent ppt. with alc., washing the granular ppt. in a filter with alc. until the washings are colorless and drying *in vacuo* at  $100^\circ$ . The resulting sodium 4-keto-8-hydroxy-1,2,3,4-tetrahydronaphthalene-2-sulfonate (tetralin-5-ol-1-one-3-sulfonate) (for reasons given below, the compd. is believed to be V rather than IV) forms apparently rhombic crystals sol. in  $H_2O$  with neutral reaction, gives with  $FeCl_3$  a red-violet color destroyed by  $NaHCO_3$ ; if boiled with a little very dil.  $H_2O_2$  and treated with  $FeCl_3$  after cooling it gives an olive-brown color intensified by alkali; Tollen soln. is immediately reduced with mirror formation; concd.  $H_2SO_4$  gives a green and then a golden yellow soln.; when V is heated, it yields a sublimate of A but most of it decomps. completely; when burned it swells up like Pharaoh's serpents; it loses no  $SO_2$  with either acids or alkalies even on boiling, only  $BaCl_2 + H_2O_2$  splitting off a small amt. on long heating on the  $H_2O$  bath; it undergoes no change when shaken or even allowed to stand overnight with Br in absolutely anhyd.  $CHCl_3$ . Phenylhydrazone of the free acid,  $C_{10}H_{10}O_4N_2S$ , from a satd. soln. of V moderately heated on the  $H_2O$  bath 10 min. with an equal vol. of Fischer reagent, is sol. in about 250 parts  $H_2O$  at  $100^\circ$ , dissolves easily in alc. but as it is very sensitive to heat when in soln. it is best purified by neutralizing to phenolphthalein in  $H_2O$  suspension with dil.  $Na_2CO_3$ , filtering and acidifying with dil.  $AcOH$ , whereupon it seps. in biscuit- or hourglass-shaped microcrystals, m.  $203^\circ$  (decompn.), forms  $H_2O$ -sol. alkali, Ba, Ca and Cu salts and an insol. Pb salt, gives with  $FeCl_3$  a faint greenish yellow color changed by  $H_2O_2$  to a brown color which is intensified by  $KOH$ , gives with boiling  $HCHO$  a  $H_2O$ - and

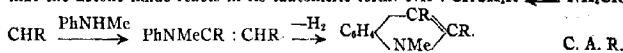
$\text{Et}_2\text{O}$ -insol. ppt. sol. in KOH and reprecipitated by acids; the hydrazone can be hydrolyzed into its components by refluxing a few min. in  $\text{H}_2\text{O}$  with a little  $\text{BzH}$ ; shaken in  $\text{Et}_2\text{O}$  with  $\text{CH}_3\text{N}_3$  it yields a cryst. Me ether. Methyl ether of V,  $\text{C}_{11}\text{H}_{15}\text{O}_5\text{SNa}$ , from V allowed to stand some days with occasional shaking with  $\text{CH}_3\text{N}_3$  in  $\text{Et}_2\text{O}$ , crystals from  $\text{H}_2\text{O}$ , gives no color with  $\text{FeCl}_3$ , even when  $\text{H}_2\text{O}_2$  is added; attempts to oxidize it, as well as the ether of the phenylhydrazone, were unsuccessful owing to the poor yields but there were many indications of the formation of 3-methoxyphthalic acid. V can be reduced by the Clemmensen method to a compd. which couples with diazotized  $\text{PhNH}_2$  to a dark red dye which, when decomposed with  $\text{SnCl}_2$  and  $\text{HCl}$ , yields, together with a minimal amt. of a  $\text{H}_2\text{O}$ -insol. acid, an easily sol. acid giving a green  $\text{FeCl}_3$  reaction. V shows no tendency to form an anhydride (sultone) and hence its structure is probably correctly represented by V rather than by IV. V does not react with dry  $\text{NH}_3$  but B does, apparently a HO group being replaced by  $\text{NH}_2$  with elimination of a mol. of  $\text{H}_2\text{O}$ . 2,7- $\text{C}_{10}\text{H}_8(\text{OH})_2$  (C), m.  $186^\circ$ , refluxed 10 days with 2 mols.  $\text{NaHSO}_4$  ( $\text{SO}_2$  being passed in several times), cooled, filtered from unchanged C, dild. with 2 vols. alc., filtered from the pptd. inorg. salts, cautiously evapd. at not too high a temp. *in vacuo*, refluxed with abs. alc. (carefully protected from moisture), filtered hot and cautiously concd. *in vacuo* yields about 20% of a compound isomeric with V, which, from its properties, seems to be an unsatd. cyclic ketone (VI); it forms light yellow crystals giving, when pure, with  $\text{FeCl}_3$  an intense red-violet color destroyed by  $\text{NaHCO}_3$ , loses part of its  $\text{SO}_2$  on short boiling in neutral or acid soln., all in alk. soln. or with  $\text{BaCl}_2 + \text{H}_2\text{O}$  on the  $\text{H}_2\text{O}$  bath, forms an aq. soln. neutral to litmus, faintly alk. to Me orange, gives with a trace of  $\text{H}_2\text{O}_2$  and a few drops  $\text{FeCl}_3$  a brown-green color changed by  $\text{NaHCO}_3$  to red-brown, partly decomps. into its components on heating, quickly decolorizes 1 mol. Br in dry  $\text{CHCl}_3$ , giving a violet flocculent ppt. sol. in  $\text{H}_2\text{O}$ ; if the soln. is evapd., however, it leaves a black-violet amorphous lac-like residue which is no longer sol. in  $\text{H}_2\text{O}$  but sol. in KOH, is reprecipitated by acids, is Br-free (all the Br probably having been lost during the evapn. as  $\text{HBr}$ ) and has the properties of a higher HO acid, yielding a Me ether with alk.  $\text{Me}_2\text{SO}_4$ . When VI is treated with dry  $\text{NH}_3$  at  $100^\circ$ , it yields a compound (probably VII), dark brown and insol. in  $\text{Et}_2\text{O}$ , which decomps. in  $\text{H}_2\text{O}$ ; the soln., acidified and extd. with  $\text{Et}_2\text{O}$ , yields C and 2,7- $\text{C}_{10}\text{H}_8(\text{NH}_2)_2\text{OH}$ , whose Ac deriv. m.  $232^\circ$  (Kehrmann and Wolff, *Ber.* 33, 1538(1900), give  $220^\circ$ ). In view of the above results, the mechanism of the Bucherer reaction is probably as follows: the naphthols, reacting in their tautomeric form, first



add  $\text{NaHSO}_4$  at the C : O group and in the resulting compds. the free HO group of the "acetal" form can be replaced by  $\text{NH}_2$ , yielding an intermediate compd. of the type of VII, which then further changes into the amine. C. A. R.



**Mechanism of the Fischer indole synthesis.** C. HOLLINS. *J. Am. Chem. Soc.* **44**, 1598-600(1922).—Of the 4 suggestions which have been made as to the mechanism of the reaction (Robinson and Robinson, Bamberger and Landau, Cohn and Reddeffen), that of Reddeffen fulfills all the conditions required if it is slightly modified by assuming that the ketone imide reacts in its tautomeric form:  $\text{NH} : \text{CRCH}_2\text{R} \rightleftharpoons \text{NH}_2\text{CR} :$



C. A. R.

**Dissociation of the so-called *N,N'*-dibenzyltetrahydro- $\gamma,\gamma'$ -dipyridyls; answer to Mr. Bruno Emmert.** ERNST WEITZ. *Ber.* **55B**, 599-600(1922); cf. E. and Parr, *C. A.* **16**, 1775.

C. A. R.

**Dihydronaphthalene series. III. The oxidation and bromination of 5,8-dihydro- $\alpha$ -naphthylamine.** F. M. ROWE AND J. S. H. DAVIES. *J. Chem. Soc.* **121**, 1000-7(1922); cf. *C. A.* **15**, 828.—The oxidation of 5,8-dihydro- $\alpha$ -naphthylamine (A) with  $\text{KMnO}_4$  in  $\text{Na}_2\text{CO}_3$  gave only  $(\text{CO}_2\text{H})_2$ , while  $\text{CrO}_3$  gave  $\text{C}_6\text{H}_4(\text{CO}_2\text{H})_2$  and  $\alpha$ -naphthoquinone. The action of 1 mol. Br upon 5,8-dihydroaceto- $\alpha$ -naphthalide (B) gave 4-bromoaceto- $\alpha$ -naphthalide (C) (*Ber.* **11**, 1906) and 6,7-dibromotetrahydroaceto- $\alpha$ -naphthalide (D), silky, leathery needles, m. 179-9.5°, sepd. by crystn. from alc. KOH in MeOH converts D into  $\alpha$ - $\text{C}_{10}\text{H}_7\text{NH}_2$ , while boiling it with Zn dust in MeEtCO gave B. 1.5 mols. Br and B gave 4,6,7-tribromotetrahydro- $\alpha$ -naphthalide (E), needles, m. 201.5-2°. E is converted by KOH into C, and by Zn dust into 4-bromo-5,8-dihydroaceto- $\alpha$ -naphthalide (F), flat, silvery needles, m. 213.5°.  $\text{HNO}_3$  in AcOH gave the 2-nitroaceto deriv., m. 234°. Attempts to hydrolyze these substances to obtain the free bases failed because of the splitting off of HBr. Therefore A was treated with 1 mol. Br, resulting in the formation of a mixt. of products, of which only the 2,4- $\text{Br}_2\text{C}_{10}\text{H}_7\text{NH}_2$  could be isolated. Upon acetylation and fractional crystn., E, F and C were isolated. C. J. WEST

**The synthesis of anthraquinone from phthalic anhydride and benzene.** E. R. HARDING. *Color Trade J.* **9**, 184-6(1921).—The process is divided into 3 steps: the formation of  $o\text{-BzC}_6\text{H}_4\text{CO}_2\text{H}$ ; conversion to anthraquinone; and refining the crude product. The  $o\text{-BzC}_6\text{H}_4\text{CO}_2\text{H}$  is prepd. by adding 1 part  $\text{C}_6\text{H}_4(\text{CO})_2\text{O}$  in 4 parts  $\text{C}_6\text{H}_6$  to 1.8 parts  $\text{Al}_2\text{Cl}_3$  and 1 part  $\text{C}_6\text{H}_6$  in a jacketed Pb-lined agitated kettle. Heating is controlled by the rate of addn. A temp. of 35° is maintained for 20-30 min., then slowly increased to 80° and held there until HCl gas is no longer evolved. The  $\text{C}_6\text{H}_6$  is then removed by distn. and the Al compd. remains as a yellow cake. The Al salt is decompd. by either  $\text{H}_2\text{O}$  or  $\text{Na}_2\text{CO}_3$  soln., and the Na salt is decompd. by the addn. of  $\text{H}_2\text{SO}_4$  when the  $o\text{-BzC}_6\text{H}_4\text{CO}_2\text{H}$  seps. as an oil which crysts. on cooling. The anhyd. acid seps. at 75° and the hydrous acid at lower temps. The yield is about 95% of the theory or 145% of the wt. of  $\text{C}_6\text{H}_4(\text{CO})_2\text{O}$ . In a sulfonator the  $o\text{-BzC}_6\text{H}_4\text{CO}_2\text{H}$  is converted by 95-98%  $\text{H}_2\text{SO}_4$  at 110-150° into  $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_4$ . The yield is 90-95% of the theory. The  $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_4$  is purified by sublimation. The yield of sublimed product is about 120% of the wt. of  $\text{C}_6\text{H}_4(\text{CO})_2\text{O}$  taken. CHAS. E. MULLIN

**Action of hydroxylamine and of hydrazine on the arylmonothioamides of ethyl acetylmalonate.** D. E. WORRALL. *J. Am. Chem. Soc.* **44**, 1551-7(1922); cf. *C. A.* **12**, 586.— $\text{PhNHCSCHAcCO}_2\text{Et}$  (A), the product of the action of PhNCS on  $\text{AcCHNaCO}_2\text{Et}$ , reacts with  $\text{NH}_2\text{OH}$  according to the equation  $\text{A} + \text{NH}_2\text{OH} \rightarrow \text{H}_2\text{S} + \text{EtOH} + \text{N} : \text{C}(\text{NHPh})\text{CHAcCO}_2\text{O} \xrightarrow{\text{H}_2\text{O}} \text{N} : \text{C}(\text{NHPh})\text{CH}_2\text{CO}_2\text{O}$  (B). Better

results are obtained with 2 mols.  $\text{NH}_2\text{OH}$ ; with 1 mol. the intermediate acetylloxazole is hydrolyzed as fast as formed and the resulting AcOH forms with the  $\text{NH}_2\text{OH}$  a salt which reacts only slowly with the A. B is sol. in both acids and bases, is not decompd. by long heating with concd. HCl, is easily benzoylated by the Schotten-Baumann method and acetylated by short heating with  $\text{Ac}_2\text{O}$ , does not react with PhNCO, betrays the

presence of a reactive  $\text{CH}_2$  group by its soly. in aq. alkali, the formation of a Cu salt, its condensation with  $\text{BzH}$  and its reaction with  $\text{HNO}_3$  and with  $\text{PhN}_2\text{Cl}$ ; it rapidly reduces  $\text{KMnO}_4$ , the  $\text{PhNH}$  group being attacked with formation of  $\text{PhNC}$ .  $\text{N}_2\text{H}_4$  reacts in a similar way with **A**, the resulting pyrazolone being very similar in its properties to **B** except that it is distinctly more base-forming. *o*- and *m*- $\text{MeC}_6\text{H}_4\text{NHCSCAACO}_2\text{Et}$  have not yet been prepd. because of the ease with which they undergo ketonic hydrolysis to  $\text{AcCH}_2\text{CSNHC}_6\text{H}_4\text{Me}$ , which are extremely sensitive to bases and are still further hydrolyzed by the  $\text{NH}_2\text{OH}$  to  $\text{MeCSNHC}_6\text{H}_4\text{Me}$  before any appreciable amt. can react in such a way as to form  $\text{H}_2\text{S}$ . The formation of a pyrazole by the action of  $\text{PhNHNH}_2$  on **A** has not been observed.  $\text{H}_2\text{S}$  is evolved and possibly a pyrazole is formed but is decompd. by the unchanged  $\text{PhNHNH}_2$ ; the formation of  $\text{NH}_3$  is evidence that other reactions take place;  $\text{PhNHNHAc}$  is formed and can be isolated. That semicarbazide and guanidine hydrolyze **A** is indicated by the formation of  $\text{EtOAc}$ ; subsequently,  $\text{H}_2\text{S}$  is slowly evolved. *3-Anilino-5-oxisoxazole* (**B**) (4.7 g. from 10 g. **A**, 2 mols.  $\text{NH}_2\text{OH}\cdot\text{HCl}$  and the calcd. amt. of  $\text{KHCO}_3$  in alc. refluxed a few min. and kept 12 hrs. at room temp.), slender cream-colored needles from alc., darkens above  $165^\circ$ , forms a black tar at  $180^\circ$ , m.  $186^\circ$  (decompn.) on rapid heating, is acid towards litmus, decomps. alkali carbonates in hot soln., does not form a salt with *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$ , forms with a few drops of aq.  $\text{NaOH}$  a pasty mass sepg. from alc. in plates, the alc. soln. rapidly becoming yellow, then deep red, and yielding unchanged **B** with  $\text{HCl}$ , gives on refluxing with concd.  $\text{HCl}$  a *hydrochloride*, m.  $135^\circ$  ( $\text{CO}_2$  evolution). *3-Anilino-4-oximino-5-oxisoxazole*, from **B** in  $\text{NaOH}$ ,  $\text{NaNO}_2$  and cold dil.  $\text{H}_2\text{SO}_4$ , slender, scarlet needles from  $\text{H}_2\text{O}$ , deflagrates  $149^\circ$ . *4-Benzeneazo compound*, from **B** in cold dil.  $\text{NaOH}$  and  $\text{PhN}_2\text{Cl}$ , yellow needles from alc., m.  $195-7^\circ$  (decompn.). *4-Benzal derivative*, from **B** heated 1 hr. in alc. with  $\text{BzH}$ , orange needles from alc., m.  $170-1^\circ$ , sol. in alkali with some decompn. *2- or 5-Acetyl derivative* of **B**, plates or flat needles from alc., m.  $145-6^\circ$ , insol. in cold  $\text{NaOH}$  but rapidly hydrolyzed to the sol. salt of **B**. *2- or 5-Benzoyl derivative*, silky needles from alc., m.  $157-8^\circ$ . *3-Anilino-5-oxypyrazole*,  $\text{N} : \text{C}(\text{NHPh})\cdot\text{CH}_2\cdot\text{CO}\cdot\text{NH}$

(5.5 g. from 10 g. **A** and 2 mols.  $\text{N}_2\text{H}_4$  refluxed 4-6 hrs. in alc.), tiny plates from alc., decomps.  $255-6^\circ$ , easily sol. in dil.  $\text{HCl}$  and  $\text{NaOH}$ , decolorizes  $\text{KMnO}_4$  and  $\text{Br}$ , reacts violently with concd.  $\text{HNO}_3$ ; *acetyl derivative*, needles, m.  $101^\circ$ ; *oximino derivative*, red needles from  $\text{H}_2\text{O}$ ; *benzeneazo compound*, maroon plates, decomps.  $211-2^\circ$ . *3-p-Toluidino-5-oxisoxazole* (4 g. from 10 g. *p*- $\text{MeC}_6\text{H}_4\text{NHCSCAACO}_2\text{Et}$  (**C**) heated 10 min. in alc. with 2 mols.  $\text{NH}_2\text{OH}$  and kept 12 hrs. at room temp.), pale yellow diamond-shaped crystals from alc., darkens above  $145^\circ$  and slowly sinters, blackens and foams  $155-6^\circ$ , forms salts with  $\text{HCl}$  and  $\text{NaOH}$ ; *oximino derivative*, orange needles, puffs  $142^\circ$ ; *acetyl derivative*, slender silky needles, m.  $149-50^\circ$ . *3-p-Toluidino-5-oxypyrazole* (5 g. from 10 g. **C** refluxed 30-40 min. in alc. with 2 mols.  $\text{N}_2\text{H}_4$ ), square plates from alc., decomps.  $240-7^\circ$ , sol. in alkalies with red color, repptd. by acids; *hydrochloride*, plates, m.  $72-3^\circ$ , rapidly hydrolyzed by hot  $\text{H}_2\text{O}$ ; *acetyl derivative*, feathery needles from alc., m.  $178-9^\circ$ . *3-p-Bromoanilino-5-oxisoxazole* (4 g. from 10 g. *p*- $\text{BrC}_6\text{H}_4\text{NHCSCAACO}_2\text{Et}$  (**D**)), slender cream-colored needles from alc., gradually darkens above  $150^\circ$  sinters, then foams and blackens  $188-9^\circ$ , seps. from  $\text{H}_2\text{O}$  in hair-like needles, sol. in alkalies and in concd.  $\text{HCl}$ , decolorizes  $\text{KMnO}_4$ ; *pyrazole* (6 g. from 10 g. **D**), tiny plate-like crystals from  $\text{H}_2\text{O}$ , m.  $234-5^\circ$  (decompn.), sol. in alkalies with rose color and in hot concd.  $\text{HCl}$ .  
C. A. R.

**Bromo derivatives of glyoxaline.** I. E. BALABAN AND F. L. PYMAN. *J. Chem. Soc.* 121, 947-58(1922).—This study was undertaken with the view of prepg. the mono- and di- $\text{Br}$  derivs. The action of  $\text{Br}$  upon glyoxaline in  $\text{CHCl}_3$  gave the tri- $\text{Br}$  deriv. (**A**), m.  $221^\circ$  (cor.) and sol. in about 280 parts boiling  $\text{H}_2\text{O}$ . When **A** is boiled with a

limited quantity of 20 %  $\text{Na}_2\text{SO}_3$ , a mixt. of the desired Br derivs. is obtained. *4-Bromoglyoxaline* (B), purified through the *picrate* (stout yellow needles, m.  $162^\circ$ , and sol. in 14 parts boiling  $\text{H}_2\text{O}$ ), forms elongated plates from  $\text{H}_2\text{O}$  and m.  $130-1^\circ$ . *Hydrochloride*, elongated prisms from 5 N HCl, contains a variable amt. of  $\text{H}_2\text{O}$  of crystn., and m.  $162-5^\circ$ . *Nitrate*, stout needles from  $\text{H}_2\text{O}$ , m.  $135^\circ$  (decompn.), and sol. in 5 parts boiling  $\text{H}_2\text{O}$ . *Hydrogen oxalate*, slender, glistening needles, m.  $218^\circ$  (decompn.), sol. in about 4.5 parts boiling  $\text{H}_2\text{O}$ . The *5-nitro derivative* results by the action of concd.  $\text{H}_2\text{SO}_4$  on the nitrate, stout needles from  $\text{H}_2\text{O}$ , m.  $279^\circ$  (decompn.). It is sol. in about 250 parts boiling  $\text{H}_2\text{O}$ , almost insol. in cold; concd. HCl gives a colorless soln., while alkalis give yellow solns. The action of Br gives *2,4-dibromo-5-nitroglyoxaline* (C), flat needles, blackens about  $170^\circ$  but does not m.  $270^\circ$ . Heated with 70% oleum at  $160^\circ$ , B gives a *5-sulfonic acid*, also sepd. from the reaction of A and  $\text{Na}_2\text{SO}_3$ , glistening prisms with 1  $\text{H}_2\text{O}$ , m.  $280^\circ$  (decompn.). It is sol. in less than 2 parts boiling  $\text{H}_2\text{O}$  and in about 35 parts cold  $\text{H}_2\text{O}$ , almost insol. in abs. alc. *Barium salt*, flat needles from  $\text{H}_2\text{O}$ , easily sol. in  $\text{H}_2\text{O}$  giving a neutral soln. On hydrolysis with concd. HCl, B is regenerated. *4,5-Dibromoglyoxaline* (D) forms fine needles (from  $\text{H}_2\text{O}$ ) or stout needles from AcOH, m.  $225^\circ$  (cor.). *Hydrochloride*, glistening plates, effervescent, decomp.  $250^\circ$ ; it dissociates on adding  $\text{H}_2\text{O}$ , giving the base. *Nitrate*, elongated plates, m.  $115^\circ$  (decompn.). The reduction of D with  $\text{Na}_2\text{SO}_3$  gives B. D did not react with  $\text{HNO}_3$ . The action of Br upon Et glyoxaline-4-carboxylate in  $\text{CHCl}_3$  gave *ethyl 2,5-dibromoglyoxaline-4-carboxylate*, stout, prismatic needles, m.  $147^\circ$  (cor.). It is sol. in about 100 parts boiling  $\text{H}_2\text{O}$  and in 5 N HCl, from which  $\text{H}_2\text{O}$  ppts. it. Upon hydrolysis with 5 parts concd. HCl and 7.5 parts  $\text{H}_2\text{O}$  for 1 hr. under reflux, the *free acid* is formed, glistening, prismatic needles with  $3\text{H}_2\text{O}$  or quadrilateral plates with 0.5  $\text{H}_2\text{O}$ , which turn brown at  $225^\circ$ . With a larger proportion of HCl, *2,5-dibromoglyoxaline* results, prismatic needles, m.  $193^\circ$ , and sol. in about 100 parts boiling  $\text{H}_2\text{O}$ . *Hydrochloride*, prisms with 1  $\text{H}_2\text{O}$ , m.  $193^\circ$ . Upon reduction with  $\text{Na}_2\text{SO}_3$  B is formed, further characterized by transformation into C. The behavior of these products towards  $\text{NaO}_3\text{SC}_4\text{H}_4\text{N}_4\text{X}$  is tabulated.

C. J. West

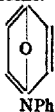
**Thiazoles. II. 2-*p*-Tolylbenzothiazole, dehydrothio-*p*-toluidine and some related compounds.** M. T. ROBERT AND M. MEYER. *J. Am. Chem. Soc.* 44, 1568-72 (1922); see M., C. A. 16, 2128.

C. A. R.

**Synthesis of isobrazilein and certain related anhydropyranol salts. II. Synthesis of isohematein.** H. G. CRABTREE AND ROBERT ROBINSON. *J. Chem. Soc.* 121, 1033-41 (1922); cf. C. A. 13, 315.—7,5',6'-Trimethoxy-2-methyl-3,4-indeno-2',1'-benzopyrylium ferrichloride (methylisobrazilein ferrichloride trimethyl ether), prepd. from dihydrobutein tri-Me ether,  $\text{Ac}_2\text{O}$  and  $\text{ZnCl}_2$  and at the end of the reaction,  $\text{FeCl}_3$  in concd. HCl, brown shining micropisms from AcMe-EtOH or orange needles with green metallic reflex from dil. HCl, darkens  $210^\circ$ , decomp.  $226-7^\circ$ . The aq. soln. has a vivid U-green fluorescence. The *2-ethyl derivative* forms glistening orange-yellow clusters of needles with varying amts. of AcOH of crystn. It is more sol. than the Me deriv. *2-Hydroxy-3,4-dimethoxyphenyl  $\alpha$ -veratrylethyl ketone* (A), by the reduction of  $(\text{MeO})_3(\text{HO})\text{C}_6\text{H}_7\text{COCH} : \text{CHC}_6\text{H}_4(\text{OMe})_2$  in alc. with H and  $\text{PdCl}_2$ , silvery leaflets, m.  $88^\circ$ . With  $\text{HCO}_2\text{H}$  and  $\text{ZnCl}_2$  and later, addition of  $\text{FeCl}_3$ , this yields *isohematein ferrichloride tetramethyl ether*, hematite-red needles with green reflex, or orange, short, unpointed, prismatic needles, m.  $191^\circ$  (decompn.), identical with the product obtained by Engels, Perkin and Robinson (C. A. 2, 3064). Upon demethylating this gave *isohematein*. 7,8,5',6'-Tetramethoxy-2-methyl-3,4-indeno-2',1'-benzopyrylium ferrichloride, from A,  $\text{Ac}_2\text{O}$  and  $\text{ZnCl}_2$ , deep brown, dense aggregates of microneedles, m.  $192-3^\circ$  (decompn.). AcONa gives the pyranol base, which forms a brown ppt. with picric acid.

C. J. West

**1-Phenyl-4-pyridone.** A. P. SMIRNOFF. *Ber.* 55B, 612-3(1922).—S. feels that

the oxide structure  for 1-phenyl-4-pyridone is confirmed by the observations

of Borsche and Bonacker (*C. A.* 16, 1429).

C. A. R.

**Some new derivatives of quinaldine.** K. I. MCCLUSKEY. *J. Am. Chem. Soc.* 44, 1573-7(1922).—The work described in the present paper in part confirms and also considerably extends the results of Gabriel and Gerhard on their 4-hydroxyquinaldine oxide (A) (*C. A.* 15, 4009). From 14.8 g. *o*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>COCHAcCO<sub>2</sub>Et stirred with a soln. of hydrated SnCl<sub>2</sub> in glacial AcOH-dry HCl is obtained 13.8 g. *ethyl 4-hydroxy-3-quinaldinecarboxylate oxide*, crystals from EtOH-H<sub>2</sub>O, m. 174°, easily sol. in NaOH, NH<sub>4</sub>OH, Na<sub>2</sub>CO<sub>3</sub> and concd. HCl, slightly in cold dil. HCl and NaHCO<sub>3</sub>, gives a reddish brown color in alc. with FeCl<sub>3</sub>, reduces NH<sub>3</sub>-AgNO<sub>3</sub> but not Fehling soln., decolorizes KMnO<sub>4</sub> in Me<sub>2</sub>CO; *chloroplatinate*, m. 203° (decompn.). Free acid, from the ester with boiling NaOH, decomps. 209° (loss of CO<sub>2</sub>), forming A (6.5 g. from 10 g. acid), which softens 246°, m. 247° (foaming), and forms a picrate, m. 171°, chloroplatinate, m. 229-30°, and mono-Bz deriv., m. 236°, identical with the compds. prepd. by G. and G.; in addition, however, it yields in alk. soln. with the calcd. amt. of BzCl in C<sub>6</sub>H<sub>6</sub> a *di-benzoyl derivative*, m. 171°, insol. in alkalis, does not decolorize KMnO<sub>4</sub> in Me<sub>2</sub>CO nor reduce AgNO<sub>3</sub>. Zn dust and HCl reduce A to 4-hydroxyquinaldine, thus adding to the evidence already available that one of the O atoms of A is attached to N, but the formation of the di-Bz deriv. requires some modification in the formulas suggested by G. and G.; probably there exists an equil. between the 2 forms  $\text{C}_6\text{H}_4 \begin{matrix} \text{C(OH):CH} \\ \diagup \quad \diagdown \\ \text{N(O):CMe} \end{matrix}$  and  $\text{C}_6\text{H}_4 \begin{matrix} \text{C(OH):CH} \\ | \\ \text{N(OH).C.CH}_3 \end{matrix}$ . The difference between the two HO groups is shown by the fact that one of the Bz groups is hydrolyzed away when the di-Bz deriv. is crystd. from 50% AcOH. A is also obtained from *o*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>COCH<sub>2</sub>Ac with SnCl<sub>2</sub>, AcOH and HCl.

C. A. R.

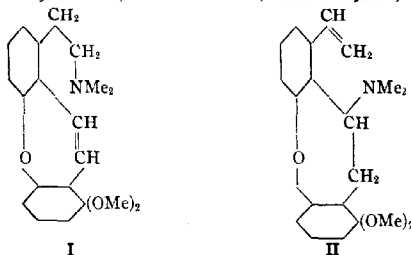
**Isoquinoline and isoquinoline reds.** J. E. G. HARRIS AND WM. J. POPE. *J. Chem. Soc.* 121, 1029-33(1922).—The fraction of com. coal-tar quinoline b. 230-255° is shaken with 24 N H<sub>2</sub>SO<sub>4</sub> for 0.5 min.; the undissolved base is removed with a little C<sub>6</sub>H<sub>6</sub> and the acid soln. extd. with 4 N NH<sub>4</sub>OH in sufficient quantity to remove 20 % of the base, which is removed by C<sub>6</sub>H<sub>6</sub>; after 11 repetitions of the NH<sub>4</sub>OH treatment, only 6.9 % of the original base remains in the acid soln., and this is finally liberated with NH<sub>4</sub>OH and extd. with C<sub>6</sub>H<sub>6</sub>; this contains 20-30 % isoquinoline, which can be purified by changing into the acid sulfate and crystg. from alc. The final yield is 1.5 % of the original quinoline fraction. Isoquinoline (A) b<sub>760</sub> 242.5°, m. 24.25°. Under the same conditions quinoline b<sub>760</sub> 236.5° and quinaldine (B) b<sub>760</sub> 247.2°. A and B are readily condensed with AlCl<sub>3</sub> to form isoquinoline red, the yield being 50% larger than any previously reported. *6'-Methylisoquinoline red*, from A, *p*-toluquinoline, AlCl<sub>3</sub> and PhCCl<sub>3</sub>, minute red needles. *6'-Ethylisoquinoline red*, minute, crimson crystals. These are *photographic sensitizers* but are much less sol. in H<sub>2</sub>O than the parent compd.

C. J. WEST

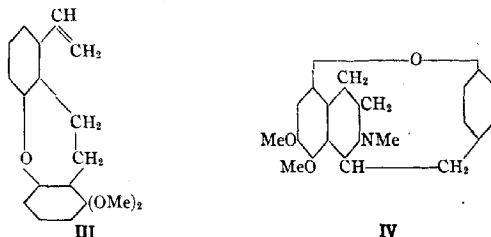
**Synthesis of quinic acid.** ADOLF KAUFMANN. *Ber.* 55B, 614-6(1922).—In connection with Halberkann's statement that thus far the quinic acid used for synthetical purposes has been almost exclusively that obtained from quinine or quinidine because none of the available methods of synthesizing it gave good enough yields (*C. A.* 16, 1771)

K. points out that, from the same wt. of *p*-anisidine, his method will give twice as much quinic acid as that worked out by H., even if in H.'s method the yield in each of the 4 steps from Et *p*-methoxydioxindolecarboxylate (the max. yield of which from *p*-anisidine and  $\text{CO}(\text{CO}_2\text{Et})_2$  is 33-7%) is 90%. C. A. R.

**Alkaloids of the pareira root. II. Isochondodendrine.** FRANZ FALTIS AND FELIX NEUMANN. *Monatsh.* 42, 311-76(1922); cf. C. A. 6, 3420.—The alkaloids obtained from the bark of *Nectandra rodiaei*, the so-called berbeerin tree, differ from those found in *Chondodendron platyphyllum*, the true source of pareira root, and it is therefore proposed to substitute the names  $\alpha$ -,  $\beta$ -, and isochondodendrine for the alkaloids formerly known as  $\alpha$ -,  $\beta$ -, and isoberbeerine, resp. Isochondodendrine has the formula  $\text{HOC}_{16}\text{H}_{19}\text{ONMeO}$ . The action of  $\text{CH}_2\text{N}_2$  gave *methylisochondodendrine* (A), cryst. crust, m. 256-7°,  $[\alpha]_D^{19} -36.8^\circ$  in alc. *Methiodide*, small needles;  $[\alpha]_D^{18} -7^\circ$  in 50 % alc. Decomn. of the quaternary compd. by Hofmann's method gave the  $\alpha$ -methine and  $\beta$ -methine, which are supposed to have formulas I and II (starting from the hypothesis that isochondodendrine is related to laudanoline). I, m. 204-5°, is optically inactive; it forms tabular, triclinic crystals,  $a:b:c = 1.0996$



$1:1.2908$ ;  $\alpha$   $91^\circ 5.5'$ ,  $\beta$   $103^\circ 27'$ ,  $\gamma$   $91^\circ 20'$ . II, m. 167-8.5°, has  $[\alpha]_D 353^\circ$  in  $\text{C}_6\text{H}_5\text{N}$  and  $359^\circ$  in EtOH. Warming with concd.  $\text{H}_2\text{SO}_4$  produces a deep red soln. with I, while II is unchanged in color; after 2 min. I suddenly turns to blue while II becomes brick-red. Reduced with Na and MeOH, I gives the  $\alpha$ -*dihydromethine* (B), m. 211.5-2°, also obtained by the reduction of A-MeCl with Na-Hg; it forms small tetragonal crystals,  $a:b:c = 1:1:0.38257$ . *Chloroaurate*, orange microneedles. The reduction of a mixt. of the two bases (I and II) with powdered NaOH and MeOH gives a N-free compound (C),  $\text{C}_{18}\text{H}_{16}\text{O}_4$ , crystg. with 1  $\text{H}_2\text{O}$ , for which formula III is suggested. This forms tabular 6-sided monoclinic crystals,  $a:b:c = 0.8721:1:0.84158$ ,  $\beta$   $99^\circ 35'$ . Detn. of the I no. indicated 2 double bonds.



Reduction of pure B gave a compound,  $\text{C}_{18}\text{H}_{18}\text{O}_3$ , with only 1 ethylene linking, tabular, monoclinic crystals,  $a:b:c = 0.84706:1:0.6160$ ,  $\beta$   $97^\circ 45.5'$ . Oxidation of C with  $\text{KMnO}_4$  gave a *tricarboxylic acid*,  $\text{C}_{17}\text{H}_{14}\text{O}_6$ , m. 177.5-8°, and forming the *anhy-*

*dride*, m. 244–5°. *Trimethyl ester*, m. 100–2°. Demethylation of the acid gave a *dicarboxylic acid*,  $C_{17}H_{14}O_7$ , m. 238–40°. The KOH melt of the acid  $C_{17}H_{14}O_8$  gave a good yield of  $p\text{-HOC}_6\text{H}_4\text{CO}_2\text{H}$ , and after methylation of the residue *2,3,5-trimethoxybenzoic acid*, leaflets, m. 141–3°. These facts indicate IV as the formula for A, in which the O bridge is in an unusual position. Confirmation of this was found in the distn. of isochondodendrine with Zn dust;  $p\text{-MeC}_6\text{H}_4\text{OH}$  was obtained. The formula of isochondodendrine will be the same as IV with HO in place of one of the MeO groups, but which one is not known.

C. J. WEST

Reduction of nitro compounds by stannous chloride (GOLDSCHMIDT, *et al.*) 2. The so-called rapic acid (GRABNER) 27. Biological difference of stereoisomeric compounds (JUNG, MÜLLER) 11A. Anodic corrosion of bismuth with some notes on bismuth compounds (PRIDEAUX, HEWIS) 4. 2-*p*-Dimethylaminostyrylpyridine methiodide (MILLS, POPE) 5.

PRINGSHEIM, H.: *Die Polysaccharide*. Berlin: J. Springer. 109 pp. M 9. Reviewed in *Fortschritte Chem.* 17, 63(1921).

**Purifying anthraquinone.** H. F. LEWIS. U. S. 1,420,198, June 20. Impurities such as oxidation products of carbazole are dissolved out from anthraquinone by the action of a halogenated hydrocarbon solvent such as warm chlorobenzene.

**Hydroquinone.** H. VON BRAMER. U. S. 1,421,869, July 4. A *p*-dihalobenzenesulfonate, *e. g.*, Na *p*-dichlorobenzenesulfonate, is heated under pressure with NaOH and  $H_2O$  to produce the Na salt of hydroquinone and hydroquinone is then recovered by addition of HCl and extn. with ether.

**Acetylisorborneol.** R. L. ANDREAU. U. S. 1,420,399, June 20. Acetylisorborneol is prepd. by heating camphene with HOAc in the presence of concd.  $H_2SO_4$  at 55–66° until the reaction is substantially completed, neutralizing the  $H_2SO_4$  with substantially anhyd. NaOAc, distg. off the HOAc formed *in vacuo* and removing  $Na_2SO_4$  from the residue by filtration or washing out with  $H_2O$ .

**Chlorinated acetyl chlorides.** CONSORTIUM FÜR ELEKTROCHEMISCHE INDUSTRIE. Ger. 340872. Cl substitution products of ethylene are treated with O, or gases contg. oxygen in the presence of non-metals or their compds. as catalysts. Br or Br compds. may be used. The oxidation of trichloroethylene, dichloroethylene, and perchloroethylene, which are themselves nonreactive with O, is facilitated by the presence of small amts. of Br, N, or S compds. Trichloroethylene is oxidized to dichloroacetyl chloride by O in the presence of Br, I, concd.  $H_2SO_4$  or concd.  $HNO_3$ . Dichloroethylene may be similarly oxidized to chloroacetyl chloride. Perchloroethylene chloride is oxidized in the presence of Br to trichloroacetyl chloride.

**Chlorinating methane.** W. O. SNELLING. U. S. 1,421,733, July 4.  $CH_4$  is chlorinated to form  $CH_3Cl$  and HCl, the resulting gaseous mixt. is brought into contact with a solvent for the  $CH_3Cl$  such as oil or  $CCl_4$  and the undissolved gases are then treated with a solvent for the HCl, *e. g.*,  $H_2O$ .

**Photochemical reactions (halogenating hydrocarbons).** W. O. SNELLING. U. S. 1,420,346, June 20. In the reaction of Cl upon methane or in similar reactions, large quantities of the reacting materials are caused to circulate within a dome-shaped glass vessel by convection currents set up by the reaction under influence of actinic rays the effect of which is mitigated sufficiently by layers of gases in various degrees of combination through which the light passes. Unusual rapidity of reaction is thus attained, since after initiation of the reaction up to 2 cu. ft. per min. of  $CH_4$  and Cl may be passed into a glass dome of 2 ft. diam. and 5 ft. high.

**Ethylene from alcohol.** M. C. WHITAKER and A. A. BACKHAUS. U. S. 1,421,640, July 4. Alc. is preheated to 300-500° and the resulting alc. vapors are then passed through a catalyzer, *e. g.*,  $\text{H}_3\text{PO}_4$  on coke or pumice, maintained at about the same temp., to produce  $\text{C}_2\text{H}_4$ .

**Fural.** E. PICARD. Can. 220,474, July 4, 1922. Cellulose material is submitted to the action of dil. acids and distd. to eliminate the fural as soon as it is formed. The distillate is passed through a column where it is washed and concd.

**Oxalate from formate.** H. W. PAULUS. U. S. 1,420,213, June 20. Finely divided dry formate is converted into oxalate by allowing it to fall through a vertical column of inert gases at a temp. of 360-440°.

**Rotatable horizontal jacketed drum with stirrers, adapted for producing sodium formate.** H. W. PAULUS. U. S. 1,420,210, June 20.

**Acetaldehyde from acetylene.** E. G. THORIN. Can. 220,175, June 27, 1922. In the production of AcH from  $\text{C}_2\text{H}_2$  the reaction liquid contg. Hg compds. is removed from the reaction chamber, deprived of its solid impurities (Hg mud, aldehyde resin) and then exposed to anodic oxidation to enrich it with Hg compds. before it is returned to the reaction chamber. The AcH and other volatile compds. may be removed from the liquid before anodic oxidation.

**Acetone.** H. W. MATHESON. Can. 220,038, June 27, 1922. Metallic bodies of substantially the same size and shape are used as catalyst carrier and heat conductor through which AcOH vapor is passed. The acid vapor circulates with equal facility in all parts of the mass.

**Vanillin.** F. BIDAUD. U. S. 1,418,904, June 6. Guaiacol 40, methylal 100 and the  $\text{ONC}_4\text{H}_9\text{NMe}_2$  derived from the reaction of  $\text{HNO}_2$  on 80 parts of  $\text{PhNMe}_2$  are added to 500 parts MeOH and the mixt. is heated on the water bath for 1-2 hrs. while gaseous HCl is bubbled through it. After cooling, the product is dild. with  $\text{H}_2\text{O}$  and the MeOH is distd. from it with steam. The remaining aq. soln. is shaken with benzene or ether to ext. vanillin which has been formed. The vanillin is purified by distn. *in vacuo* or by crystn. from  $\text{H}_2\text{O}$  or benzene.  $\text{CH}_2\text{Cl}_2$  110 parts may be used instead of the 100 parts methylal with the same result. Methylene diacetate 170 or methylene sulfate 140 parts also may be substituted as starting materials.

**Vanillin from acetylisoegenol.** W. C. SIEVERS and L. GIVAUDAN and Co. Swiss. 89,053. Acetylisoegenol is oxidized in the presence of aromatic aminocarboxylic acids. *E. g.*, acetylisoegenol, as such, or dissolved in an appropriate solvent, is added to an aq. soln. of  $\text{Na}_2\text{Cr}_2\text{O}_7$ . The mixt. is mechanically shaken at 80° while a soln. of *p*-aminobenzoic acid in 50%  $\text{H}_2\text{SO}_4$  is added. *Acetylvanillin* is extd. from the products of reaction. The bisulfite compd. is obtained and treated successively with acid and NaOH.

**Acetic anhydride.** SHUICHIRO OCHI, MINORU MASUNO and TOYOKICHI TAKAMATSU. Japn. 39,490. Aug. 9, 1921. In the presence of chlorides of some metals, such as Al, Mn, Fe, Co, Ni, As, Mo, Sn, Sb, and W, alkali acetates are changed to  $\text{Ac}_2\text{O}$  by the action of  $\text{S}_2\text{Cl}_2$  in good yield. A mixt. of 74 g. dried NaOAc and 3 g. Sb is put into a flask, 60 g.  $\text{S}_2\text{Cl}_2$  diluted with  $\text{Ac}_2\text{O}$  added and that flask is heated at 100° in an oil bath and agitated for 2 hrs. Thirty-six g.  $\text{Ac}_2\text{O}$  of 90% purity is produced, the utilization ratio of the material being about 80%. Instead of the metallic chloride, metals or their compds. which easily produce metallic chlorides by the action of  $\text{S}_2\text{Cl}_2$  may also be used as the catalyzer.

**Neutral soluble double compounds of the alkylxanthines and their *N*-acyl derivatives.** KNOLL & Co. Ger. 340,744. Dialkylxanthines and their *N*-acyl derivs. form sol. cryst. salts with alkali benzoates and salicylates. The following double compds. are mentioned: theophylline-Na salicylate; theobromine-Na salicylate; *N*-acetyltheobro-

mine-Na salicylate; theophylline-Na benzoate; *N*-acetyltheobromine-lithium salicylate; *N*-acetyltheobromine-NH<sub>4</sub> salicylate; *N*-acetyl theobromine-K salicylate; theophylline-Na salicylate; theophylline-K benzoate.

**Triazoles of the aromatic series ( $\psi$ -azimides).** KALLE & CO., AKT. GES. GER. 338,926. *o*-Aminoazo dyes, in particular those which contain amino and hydroxyl groups in addition to the amino group present in the *o*-position to the azo group, are treated with cuprammonium salts. The product from diazotized sulfanilic acid and *m*-tolylenediamine is dissolved in water and treated with NH<sub>4</sub>OH. An aq. soln. of Cu sulfate and 25% NH<sub>4</sub>OH soln. is added and the mixt. is heated at 90° for a few hrs. On cooling, the NH<sub>4</sub> salt of 5-amino-2-*p*-sulfophenyl-6-methyl- $\psi$ -aziminobenzene crystallizes out. 5-Amino-2-phenyl- $\psi$ -aziminobenzene,

PhN $\begin{array}{c} \diagup \text{N} \diagdown \\ | \quad | \\ \text{N} \quad \text{N} \end{array}$ C<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>, is similarly obtained from benzeneazo-*m*-phenylenediamine. It crystallizes from glacial AcOH and m. 183°. The dye from diazotized 5-aminosalicylic acid and *m*-tolylenediamine gives similarly 5-amino-2-*p*-hydroxy-*m*-carboxyphenyl-6-methyl- $\psi$ -aziminobenzene, CH<sub>3</sub>O<sub>2</sub>C<sub>6</sub>H<sub>3</sub>(OH)N $\begin{array}{c} \diagup \text{N} \diagdown \\ | \quad | \\ \text{N} \quad \text{N} \end{array}$ C<sub>6</sub>H<sub>3</sub>MeNH<sub>2</sub>.

**Preparation of dimethyl- and diphenylarsinecarboxylic acids.** A. JOB and H. GUINOT. Fr. 521,119 and 521,469. Cacodyl cyanide, AsMe<sub>2</sub>CN, and diphenylarsine cyanide, AsPh<sub>2</sub>CN, resp., are submitted to hydrolysis by the usual methods for the prepn. of carboxylic acids from nitriles. By hydrolysis of cacodyl cyanide with dil. H<sub>2</sub>SO<sub>4</sub> and subsequent neutralization with Ca(OH)<sub>2</sub>, the Ca salt of dimethylarsinecarboxylic acid is obtained, from which the free acid, AsMe<sub>2</sub>CO<sub>2</sub>H, is formed by decomn. with acids and recrystn. from an appropriate solvent. It reddens blue litmus and gives stable salts with a number of common metals and alkaloïds. Diphenylarsinecarboxylic acid, AsPh<sub>2</sub>CO<sub>2</sub>H, is similarly prepd. By treatment of diphenylarsine cyanide with H<sub>2</sub>O<sub>2</sub> or substances forming H<sub>2</sub>O<sub>2</sub>, diphenylarsinoformamide, AsPh<sub>2</sub>CONH<sub>2</sub>, is formed with evolution of O and may be obtained by crystn. from suitable solvents. It is decomposed by HNO<sub>3</sub> giving N and diphenylarsinecarboxylic acid.

***p*-Methylaminophenol.** SOCIÉTÉ ANON. POUR L'INDUSTRIE CHIMIQUE BALÉ. SWISS 88,561. *p*-Arylsulfonamidophenyl esters of the formula Acyl.O.C<sub>6</sub>H<sub>4</sub>.NH.SO<sub>2</sub>.Aryl are methylated on the N-H atom and the monomethyl derivs. thus obtained are hydrolyzed to form *p*-methylaminophenol by the usual methods. By treatment of Me.C<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>NHC<sub>6</sub>H<sub>4</sub>OSO<sub>2</sub>C<sub>6</sub>H<sub>4</sub>Me, with NaOH solns., the Na salt is obtained as leaf-like, white crystals. This is heated with MeOH and MeCl under pressure for a few hrs. at 100–20°, whereby *q*-toluenesulfonmethylamidophenyl toluenesulfonate is obtained; it forms needles, m. 162°. This is heated with 70% H<sub>2</sub>SO<sub>4</sub>, and by cautious addn. of water to the brown product a clear soln. is obtained, which is heated with dil. Na carbonate soln.; *p*-MeNHC<sub>6</sub>H<sub>4</sub>OH is extd. from the weak alk. soln. with ether.

## 11—BIOLOGICAL CHEMISTRY

PAUL R. HOWE

A—GENERAL

FRANK P. UNDERHILL

**Role of inorganic salts in the functions of the cell.** S. G. ZONDEK. *Ber. pharm. Ges.* 32, 1–15(1922); *J. Chem. Soc.* 122, I, 399.—Inorg. salts in the living cell play an important part in the chem. mechanism by means of which it performs its functions. Apart from their role as catalysts, as, for example, Fe as O-carrier in hemoglobin,



attention is directed to the influence exerted by the ions, particularly the cations, on the cell colloids, including protoplasm. The detg. factor in this case is not osmotic pressure, but the actual valency of the ions. Both univalent and multivalent cations alone inhibit the living functions, but if both are present together in suitable proportions, as, for example, Na or K, and Ca as in Ringer soln., then the toxic effect is removed. This antagonistic action of uni- and bi-valent cations is observable in the higher organisms so, for example, Na salts, and still more pronouncedly K salts, lead to a stoppage of an isolated frog heart with relaxation of the muscles, while Ca salts lead also to a stoppage with contracted muscles. With a mixt. of the 2 ions the heart action remains normal. These phenomena are attributable to the physico-chem. influence which the respective ions exert on the colloidal state of the cell protoplasm. W. O. E. \*

**Sweetening power of *p*-hydroxyphenylcarbamide derivatives.** C. SPECKAN. *Ber. pharm. Ges.* 32, 83-107 (1922).—The present study forms a link in a chain of systematic investigations on the question of *relationship between taste and chem. constitution* in the group of sweeteners. In view of the fact that the ethoxy group of dulcin appeared to function as the carrier of the sweet taste, a long series of expts. was undertaken to modify this group by substituting halogen or various radicals for H in the terminal  $\text{CH}_3$ , and to observe what change if any would result in the sweetening power. Thus,  $\beta$ -bromo-*p*-phenylcarbamide ( $\beta$ -bromodulcin) proved to be still strongly sweet and more readily sol. in hot  $\text{H}_2\text{O}$  than dulcin. Halogen cannot, however, according to Sternberg (cf. Franckel's *Arzneimittelsynthese*, 4th ed.) operate as a depressant on the sweetening power of a compd. The lowering of the sweet taste in the above instance is explained in the increase in mol. wt. through the substitution. An analogous Cl deriv., which in point of mol. wt. stands about midway between dulcin and its Br compd., could not be prepd. owing to the tendency of  $\text{C}_6\text{H}_4\text{Cl}_2$  to yield with  $\text{NaOEt}$   $\text{ClC}_6\text{H}_4\text{OEt}$  at 40 to 50°, or  $\text{C}_6\text{H}_4(\text{OEt})_2$  at higher temps. In prep.  $\beta$ -bromodulcin from  $\text{C}_6\text{H}_4\text{Br}_2$  and *p*-hydroxyphenylcarbamide, the tasteless by-product  $\text{C}_6\text{H}_4(\text{OC}_6\text{H}_4\text{NHCONH}_2)_2$  was also obtained. Sternburg's rule (l. c.) that doubling of the substituted benzene nucleus inhibits development of physiol. properties again finds corroboration. Various attempts to substitute the halogen of bromodulcin by means of  $\text{NH}_2$  or aliphatic amines yielded only poorly characterized compds. of bitter taste. The substitution of  $\text{PhNH}$ ,  $\text{EtOC}_6\text{H}_4\text{NH}$ ,  $\alpha$ -,  $m$ -, and  $p$ - $\text{MeC}_6\text{H}_4\text{NH}$  and  $\text{Me}_2\text{C}_6\text{H}_4\text{NH}$  in the  $\text{EtO}$  group completely suppressed the sweet taste. It was further sought to prove whether, with entire disregard to the influence of the  $\text{EtO}$  group, a similar sweetening effect might not be again developed through union of corresponding groups with *p*-hydroxyphenylcarbamide. Thus, *p*-carbethoxyphenylcarbamide was entirely without taste, as also *p*-carbamidodiphenylcarbamate ester, *p*-carbamidophenyl- $\alpha$ -oxyethylbutyrate, *p*-carbamidophenylglycid ether. While *p*-benzoyloxyphenylcarbamide possessed a transitory acid taste finally becoming faintly sweet, the di-Bz deriv. formed at the same time was tasteless. Compds. derived from aldehydes or ketones, as benzoyl-*p*-anisylcarbamide, semicarbazone and phenylhydrazine of *p*-nitrophenoxyacetone, *p*-acetyloxyphenylcarbamide and semicarbazone were all without taste.  $\beta$ -Hydroxypropyl-*p*-oxyphenylcarbamide tasted faintly sweet. The new compds. prepd. in the course of this study are further characterized:  $\beta$ -bromo-*p*-phenylcarbamide,  $\text{BrC}_6\text{H}_4\text{OC}_6\text{H}_4\text{NHCONH}_2$ , silky needles, m. 162-4°; ethylenebis-*p*-oxyphenylcarbamide, silky needles, m. 342°;  $\beta$ -anilino-*p*-phenylcarbamide,  $\text{PhNHC}_6\text{H}_4\text{OC}_6\text{H}_4\text{NHCONH}_2$ , fine needles, m. 230°;  $\beta$ -*p*-phenetidino-*p*-phenylcarbamide, leaflets, m. 215°;  $\beta$ -*p*-toluidino-*p*-phenylcarbamide, microcrystals, m. 180°;  $\beta$ -*o*-toluidino-*p*-phenylcarbamide, microcrystals, m. 228-30°;  $\beta$ -*m*-toluidino-*p*-phenylcarbamide, crystals, m. 215°;  $\beta$ -*m*-xyloidino-*p*-phenylcarbamide, crystal aggregates, m. 255°; *p*-carbamidophenyl ethyl carbonate,  $\text{EtOCO}_2\text{C}_6\text{H}_4\text{NHCONH}_2$ , needles, m. 158°; *p*-carbamidophenyl diphenylcarbamate ester,  $\text{NH}_2\text{CONHC}_6\text{H}_4\text{OCOPh}$ .

crystals, m. 240°; *p*-carbamido- $\alpha$ -oxybutyric ester,  $\text{NH}_2\text{CONHC}_4\text{H}_7\text{OCH}(\text{Et})\text{CO}_2\text{Et}$ , m. 90°; *p*-carbamidophenylglycid ether,  $\text{NH}_2\text{CONHC}_6\text{H}_4\text{OCH}_2\text{CHCH}_2\text{O}$ , crystals, m. 235°;

*benzoyl-p*-oxyphenylcarbamide,  $\text{BzOC}_6\text{H}_4\text{NHCONH}_2$ , yellowish brown needles, m. 148°; *dibenzoyl compd.*,  $\text{BzOC}_6\text{H}_4\text{NHCONHBz}$ , crystals, m. 226–8°; *phenacyl-p*-oxyphenylcarbamide,  $\text{BzCH}_2\text{OC}_6\text{H}_4\text{NHCONH}_2$ , faint yellow crystals, m. 140° (sinters 135°); *acetonyl-p*-oxynitrobenzene, m. 82° (*semicarbazone*, m. 225°; *phenylhydrazone*, golden needles, m. 155°; *oxime*, yellowish silky needles, m. 105°); *acetonyl-p*-oxyaminobenzene,  $\text{AcCH}_2\text{OC}_6\text{H}_4\text{NH}_2$ , m. 238°; *acetonyl-p*-oxyphenylcarbamide, m. 172° (*semicarbazone*,  $\text{MeC}(\text{N}_2\text{HCONH})\text{CH}_2\text{OC}_6\text{H}_4\text{NHCONH}_2$ , cryst. powder, m. 190°; *phenylhydrazone*, yellow silky crystals m. 145°);  *$\beta$ -hydroxypropyl-p*-oxyphenylcarbamide,  $\text{MeCHOHCH}_2\text{OC}_6\text{H}_4\text{NHCONH}_2$ , crystals, m. 176°.

W. O. E.

**Studies on the action of poisons.** The action of quinine and atoxyl on liver lipase. P. RONA AND R. PAVLOVIC. *Biochem. Z.* 130, 225–38(1922); cf. *C. A.* 15, 3117.—The enzymic properties of liver lipase as tested with tributyrin are identical with those of blood lipase. Nevertheless the reactions of the 2 towards quinine are quite different for while 0.01 mg. in 50 cc. total vol. of the drug inhibits serum lipase activity, liver lipase is uninfluenced by as much as 10 mg. If the 2 enzymes are mixed neither takes on the characteristics of the other with regard to the response to quinine. Hence it is possible to follow quant. the reaction of both enzymes in mixts. of the 2. On the other hand liver lipase is much more sensitive towards atoxyl than is serum lipase, 0.0001 mg. of the drug in 55 cc. total vol. exerting an inhibiting effect on the former. The course of the poisoning seems to follow the same law as that with serum lipase: When the concn. of the poison is increased in a geometric ratio series the velocity const. of tributyrin splitting decreases in an arithmetic ratio. All the toxic effects are irreversible.

F. S. HAMMETT

**Studies on hemocyanin.** VI. The action of some gases on hemocyanin. CH. DHÉRAÉ AND A. SCHNEIDER. *J. physiol. path. gén.* 20, 1–13(1922).—Studies on the effects of H, N,  $\text{CO}_2$ , CO, NO,  $\text{CH}_4$ ,  $\text{C}_2\text{H}_2$  and  $\text{C}_2\text{H}_4$  on hemocyanin. The oxyhemocyanins from the various species used are as easily and rapidly reduced by treatment with an inert gas at 15° to 20° as by a vacuum at 40°. The technic used was exacting and antiseptic conditions obtained. VII. *Ibid* 34–40.—With NO, hemocyanin forms a green pigment which is crystallizable, slightly unstable but yet more stable than oxyhemocyanin. Reduced hemocyanin when mixed with  $\text{CH}_4$ ,  $\text{C}_2\text{H}_4$  or  $\text{C}_2\text{H}_2$  at 20° does not form colored compds. with these substances.

F. S. HAMMETT

**The action of poisons on enzymic processes.** VII. Metal catalysis and catalase action. C. G. SANTESSON. *Skand. Arch. Physiol.* 47, 129–81(1922).—The results of these extended expts. show that the amt. of catalyzer is of importance when the material acted upon is const. Colloidal metals in minute amts. are often ineffective. Frog muscle catalase shows similar properties though not as regularly. The effective amt. of catalase is as yet unknown though it may be around 0.06 mg. A low temp. (0.6 to 0.9°) markedly decreases the  $\text{O}_2$  evolution action of colloidal Ag. Heating of the soln. also inhibits its activity. Muscle catalase is similarly affected. A study was made of the effect of a series of ions on the activity of colloidal Ag and muscle catalase. The results are recorded in detail. They show the wide difference in response of the 2 types of catalysts. VIII. The volumetric method for catalase determination. *Ibid* 191–208.—An historical and critical discussion of the various methods for the detn. of catalase activity. S. favors the use of a  $\text{H}_2\text{O}_2$  soln. of higher concn. than others use, finding that 0.211% or 0.062 *N* is not harmful.

F. S. HAMMETT

**Soap and serum.** ADOLF JARISCH. *Klin. Wochschr.* 1, 71(1922).—Sodium soaps undergo hydrolysis in a medium having a  $p_H$  less than 8.5; but when soap is added

to blood serum, whose  $p_H$  is far below this value, the liquid remains clear. To explain this fact J. dialyzed serum until it was free from salt and then added soap to one portion and colloidal fatty acid to the other. In each case a voluminous ppt. was obtained that had all the physical characteristics of euglobulin. This ppt. was completely sol. in a 0.012 *N* soln. of NaCl, which explains the fact that no ppt. is obtained with normal serum. Entirely similar ppts. are obtained when commercial lecithin or alc. exts. of tissue are added to dialyzed serum. In every case the salt-sol. ppt. appears to be an adsorption compound between the lipid and the pseudoglobulin of the serum. M. H.

Studies on carbonic acid compounds and hydrogen-ion activities in blood and salt solutions. E. J. WARBURG. *Biochem. J.* 16, 153-340(1922).—Donnan's theory of the distribution of permeating ions in two-phase systems contg. non-permeating ions is discussed and developed particularly with regard to its application to blood. The distribution of chloride between the blood cells and serum of horse blood has been detd. It has been proved that the distribution of bicarbonate and chlorine ions between blood cells and serum is in accord with Donnan's theory. The view that the vol. change of the blood cells which is detd. by the reaction is an osmotic phenomenon has been strengthened. The elec. potential of the surface blood cells has been calcd. with Donnan's equation. It is theoretically impossible directly to det. the apparent chlorine ion activity of the blood with an electrode of the second class. BENJAMIN HARROW

Action of whole blood upon acids. E. L. KENNAWAY AND JAMES MCINTOSH. *Biochem. J.* 16, 380-6(1922).—If a series of amts. of  $H_2SO_4$  is added to plasma, and to whole blood, so as to produce  $p_H$  between 7 and 4, it is found that the amt. of titratable material removed by whole blood increases with the amt. added in such a way that a roughly const. percentage, namely about 80% of the acid, disappears; whereas the amt. neutralized by plasma does not vary with the amt. added. BENJAMIN HARROW

Researches on photodynamic phenomena. II. Photocatalytic and photobiological reactions. G. VIALLE. *Arch. soc. biol.* 1, 259-65(1920); *Physiol. Abstracts* 6, 117-8(1921); cf. *C. A.* 15, 2448.—Study was made of the action of certain salts of U, Fe, and Mn on erythrocytes and on a mixt. of 4 vols. 1% starch soln. and 1 vol. 1% KI soln. The salts of the 3 metals were found not suitable for the production of photodynamic phenomena in cells. Salts of U and  $UO_2$ , but not those of Mn and Fe, caused oxidation of KI in the sunlight in a few min.; only the fluorescent salts were photodynamically active. While U salts were photodynamically active, they did not act on cells, probably because they were not absorbed. The solar light must be considered as a const. factor in the detn. of photodynamic phenomena. J. S. H.

Law of the action of invertase; velocity of hydrolysis and reaction of the medium. H. COLIN AND A. CHAUDUN. *Compt. rend.* 174, 218-20(1922).—The velocity of the reaction at first increases, then decreases, as the acidity of the medium becomes greater. When the acidity is markedly high, the mass of sucrose, with which the invertase combines, is decreased. Consequently the rate of action of the enzyme on the substrate is diminished. JOSEPH S. HEPBURN

Biological differences of stereoisomeric compounds. A. JUNG AND H. MÜLLER. *Helvetica Chim. Acta* 5, 239-43(1922).—Fumaric acid is converted into lactic acid by the action of a carboxylase which is secreted by yeast. Maleic acid is entirely unattacked by yeast. While fumaric acid is converted into dextrose when administered to a phlorhizinized dog, maleic acid does not give rise to sugar in such an animal, but acts as a poison. The toxicity of maleic acid is attributed to its failure to be converted into lactic acid and dextrose in the animal body. Study of the rate of formation of  $CO_2$  by yeast in 1% sugar soln., in the presence and in the absence of either or both 1% of maleic acid and 1% of fumaric acid, showed that fumaric acid accelerated fermentation and functioned as a stimulator, while maleic acid had the opposite action. Yeast, acting on equimol. solns.

of fumaric acid and malic acid, produced more  $\text{CO}_2$  from malic acid than from fumaric acid. In the animal body, the course of metabolism is from succinic acid through, first fumaric acid, then malic acid, to lactic acid. Apart from decarboxylation, fumaric acid adds  $\text{H}_2\text{O}$  under the action of yeast and is converted into malic acid; malic acid does not react in this manner. Crotonic acid was not attacked by yeast, while yeast soon produced a marked evolution of  $\text{CO}_2$  from a 10% soln. of  $\beta$ -hydroxybutyric acid; these phenomena support the view that fumaric acid is converted into malic acid before  $\text{CO}_2$  is evolved from it by yeast. Neither acrylic acid nor cinnamic acid was fermented by yeast.

JOSEPH S. HEPBURN

**Electrochemical theory of normal and certain pathological processes.** G. W. CRILE. *Proc. Am. Phil. Soc.* 60, 546-52(1921).—Man is an electrochem. mechanism. The unit structure of animals is a nerve-cell battery, its prolongation (the nerve fiber) to the synapse or key, and the nerve fiber from the synapse to the muscle cell or gland. An elec. current from the nerve cell closes the synapse, completes the circuit, and produces action by the muscle or gland. Periods of discharging and of recharging these nerve cell batteries correspond to periods of consciousness and of sleep, resp. Artificially induced iodism produced heightened activity and thereby markedly increased the cond. of the brain, spinal cord, muscles, and other organs and tissues. Injections of toxins and of adrenaline produced an immediate increase in the cond. of the brain. Bodily activity and acidosis decreased the p. d. within the cells (between nucleus and cell body). The adrenals control oxidation; the thyroid governs metabolic rate, and thereby controls elec. cond.; the nervous system controls both glands. The prime function of the liver is to neutralize acids, and thereby to prevent their accumulation within the cell batteries, and the consequent destruction of the equil. between acids and bases. Clinical experience teaches that, for the maintenance of the electrochem. system, the organism requires an abundant supply of fresh water and of  $\text{O}_2$  for the internal respiration, an approx. normal temp. both local and general, an abundance of mental and physical rest and sleep; moreover, the physical structure of the cells must not be impaired by the trauma of the operation or by the anesthetic.

JOSEPH S. HEPBURN

**Optical rotatory power of crystalline ovalbumin and serum albumin.** E. G. YOUNG. *Proc. Roy. Soc. London* 93B, 15-35(1922).—Cryst. *hen ovalbumin* has a sp. rotation  $[\alpha]_D^{18} = -30.81^\circ$  and  $[\alpha]_D^{15} = -37.53^\circ$ . These values are const. within the limits of exptl. error after the 2nd crystn., provided recrystn. be done at approx. the isoelec. point  $p_H$  4.9 to 5.1. At lower H-ion concns., i. e.,  $p_H$  5.3 to 5.4,  $[\alpha]$  constantly has a lower value:  $[\alpha]_D^{15} = -30.14^\circ$  and  $[\alpha]_D^{18} = -36.80^\circ$ . The optical rotation of an albumin remains const. at its isoelec. point, promptly rises to a new const. level if the soln. be made slightly acid, and promptly decreases, then very slowly rises to its original value if the soln. be made alk. to a H-ion concn.  $p_H$  4.9. These variations may be produced from either side of the isoelec. point, are reversible, and are ascribed to a tautomeric equil. of the lactam-lactim type. Globulith formation is indicative of hydrate formation and not of the power of a protein to crystallize. *Horse serum albumin* was prepd. by pptn. and complete dehydration of the mixed proteins of the serum at a temp. of  $-4^\circ$  by means of abs. alc. and ether, removal of lipins by extn. in a Soxhlet app., and crystn. of the albumin from aq. soln. of  $(\text{NH}_4)_2\text{SO}_4$ ; 70.4% of the total albumin was obtained in the cryst. form. The product had a const. rotatory power after the 1st. crystn.;  $[\alpha]_D^{18} = -62.8^\circ$  and  $[\alpha]_D^{15} = -78.3^\circ$ . This albumin was also prepd. by extn. of the serum with ether, removal of the globulins by addition of an equal vol. of satd. aq. soln. of  $(\text{NH}_4)_2\text{SO}_4$ , and crystn. of the albumin from the resulting soln. after rendering its H-ion concn. between  $p_H$  5.0 and 6.0 by addition of 10% AcOH or  $1/2$  N  $\text{H}_2\text{SO}_4$ ; 82% of the total albumin was obtained in the cryst. form. The product had a const. rotatory power after the 3rd. crystn.;  $[\alpha]_D^{18} = -62.8^\circ$  and  $[\alpha]_D^{15} = -74.8^\circ$ . The insol. residue from the 1st

crystn. from natural serum was found to be a deposit of lipins about the crystal surface; at times phosphatides, at times cholesterol esters predominated in these lipins. J. S. H.

**Aims and boundaries of physiology.** W. M. FLETCHER. *Rept. Brit. Assoc. Advancement Sci.* 1921, 125-42.—The modern trend of the various medical sciences, including *biological chemistry*, is to study the organism as a whole. JOSEPH S. HEPBURN

**Precipitating action of chloroform upon the solution of pure fibrinogen.** P. NOLF. *Réunion soc. belge biol.* 1921, 273-5; *Physiol. Abstracts* 6, 187.—If a soln. of pure fibrinogen be shaken vigorously with  $\text{CHCl}_3$ , a portion of the fibrinogen is pptd. The pptd. fibrinogen is unaltered, can again be dissolved in a saline soln., and may be coagulated by the action of thrombin. JOSEPH S. HEPBURN

**Growth in living and non-living systems.** R. S. LILLIE. *Sci. Monthly* 14, 113-30 (1922).—Attention is drawn to the similarities between the growth of living organisms and the growth of such inorganic substances as ice crystals, lead trees, and pptn.-filaments. JOSEPH S. HEPBURN

**Catalase.** THEO. C. BURNETT. *Univ. Calif. Pub. Physiol.* 5, 167-70 (1921).—Catalase was not destroyed by direct contact with ether when that compd. was added to blood or to an aq. ext. of liver. Catalase is a constituent of the cell itself; its function is to catalyze org. peroxides, liberating mol.  $\text{O}_2$ , and thus protecting the tissues from the harmful effects of the accumulation of these peroxides. JOSEPH S. HEPBURN

**Crystallization of hemoglobin.** G. AMANTEA AND C. KRZYSZKOWSKY. *Arch. fisiol.* 18, 87-92 (1920).—Crystn. of hemoglobin from the blood of many animals can easily be effected if hemolysis is produced by saponaria-saponin (not, however, with human blood and blood of frogs and toads). The hemoglobin of nucleated corpuscles is crystd. with difficulty. Addn. of gum arabic to red corpuscles may induce the formation of hemoglobin crystals. J. C. S.

**The minimum of odor perceptible in an absolutely inodorous space (camera inodorata).** K. KOMURO. *Arch. Néerland Physiol.* 6, 20-4 (1921).—The camera is a large glass box which can be made inodorous by means of a Hg vapor lamp and into which the head of the experimenter can be introduced. Inside this chamber the min. necessary for perception of a number of odors is 20-25% less than outside, that is, the nose becomes more sensitive when all other odors are eliminated. J. C. S.

**Behavior of diastase and other enzymes under unfavorable conditions. Action of some nitrogenous compounds on germination.** TH. BOKORNY. *Biedermanns Zentr.* 50, 429-30 (1921).—Brief reference is made to the effect of acids, bases, salts of heavy metals, etc., on such enzymes as diastase, invertase, pepsin, myrosin, and trypsin. From an examn. of the effect of urea, hippuric acid,  $\text{NH}_4$  salts, and  $\text{NaNO}_3$  on germination, it is shown that nutrient materials are injurious if used at too high a concn. J. C. S.

**Ultramicroscopical investigation of casein.** B. BLEYER AND R. SEIDL. *Kolloid-Z.* 30, 117-18 (1922); cf. *C. A.* 16, 1962.—Casein and paracasein behave differently towards alkalis and alk.-earth hydroxides than towards acids, inasmuch as the individual particles as seen in the ultramicroscope are much larger in acid solns. The particles of the casein derivs. are larger and move more slowly than those of the paracasein derivs. The acid casein and paracasein derivs. are not true chem. compds. but adsorption complexes. J. S. C. I.

**Action of hydrolytic enzymes. II.** M. H. VAN LAER. *Bull. soc. chim. Belg.* 30, 261-5 (1921); cf. *C. A.* 16, 1966.—L.'s hypothesis, that a hydrolytic enzyme owes its activity to its capacity for adsorbing substrate and H ions, involves the possibility of an enzyme acting on all hydrolyzable substances which it adsorbs. In such a case, the optimal concn. of H ions should be independent of the particular substrate acted on, for this optimum is regarded as a characteristic of the enzyme itself, being the point beyond

which the coagulating effect of further increases in the concn. of H ions, on the enzyme particles, preponderates over their catalytic effect on hydrolysis. Among the hydrolytic transformations effected by malt ext., those relating to starch, proteins, esters, and amygdalin (cf. *C. A.* 16, 1439) are all subject to the same optimal reaction, and may accordingly be due to one enzyme.

J. C. S.

**Coloration of potato juice.** H. HAEHN. *Z. Spiritusind.* 44, 253-4, 277-8, 286, 325, 330(1921); cf. *C. A.* 14, 1551, 2207; 15, 3646.—The enzymic conversion of tyrosine into the dark-colored product, melanin, appears to be of wide occurrence in animal and plant tissues. The tyrosinase of potatoes acts best in media neutral to litmus; its action is inhibited by addn. of free acid or alkali, but not by addn. of  $\text{KH}_2\text{PO}_4$ , even in quantity sufficient to render the liquid decidedly acid to litmus. The therminolabile component of the tyrosinase of potato juice can be freed from accompanying activating salts more completely by dialysis through a suitable septum than by ultra-filtration. After dialysis for several days the residue is almost inactive towards tyrosine, but its activity is restored on adding the salt mixt. removed by dialysis. Much greater activation is produced by adding very small amts. of single salts of certain metals. Salts of Ca, Sr, Ba, Mg, Zn, and Cd are most active in this respect, while salts of K, Na, Al, Hg, Mn, Cu, and U have little or no effect. In general the reaction on tyrosine gives rise to a succession of color changes passing through pink, red, reddish brown, violet and dark blue, to black, but in certain cases some of these stages appear to be omitted, and when Zn or Ca salts are used as activators a deep blue coloration and ppt. are formed very rapidly. These colors are probably due to differences in the size of the melanin particles (cf. *C. A.* 15, 3646); if a soln. contg. red melanin is boiled it becomes black. It is suggested that the formation of melanin involves the following steps: conversion of tyrosine into *p*-hydroxyphenylacetaldehyde by elimination of  $\text{CO}_2$ ,  $\text{NH}_3$ , and H, the last being taken up by an acceptor; introduction of a further hydroxyl group into the benzene nucleus; condensation with the previously liberated  $\text{NH}_3$ , and oxidation, to form dihydroxyindigo or melanin. This view of the constitution of melanin is supported by the fact that hyposulfites yield a colorless leuco compd., and also by the formation of derivs. of indole and pyrrole on fusing melanin with NaOH. The org. component of tyrosinase thus probably contains several enzymes, including a phenolase, an amino-acidase, and an unknown condensing enzyme. Some suggestions are made concerning the function of the inorg. component of tyrosinase.

J. S. C. I.

**The action of ultraviolet light on egg albumin in relation to the isoelectric point.** J. H. CLARK. *Am. J. Physiol.* 61, 72-9(1922).—The expts. support the theory that the action of light on org. compds. is an emission of electrons from the substance affected, i. e., the ionization of photoelec. mols. Radiation of solns. of egg albumin by ultraviolet light produces a greater aggregation when the albumin particles are negatively charged and a state of greater dispersion when they are uncharged or charged positively.

J. F. LYMAN

**The rate of methemoglobin formation from carboxyhemoglobin.** T. K. KRUSE. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 289(1921).—The rate of methemoglobin formation from carboxyhemoglobin is 160 to 200 times slower than it is from oxyhemoglobin. This fact is utilized as the basis for a qual. and quant. method for CO in blood.

J. F. LYMAN

**The effect of various temperatures on blood catalase.** O. O. STOLAND AND L. WALLING. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 305(1921).—Catalase seems to differ from other enzymes of the animal body in that it does not show its optimum activity at body temp. The blood of some animals (dogs, rabbits) has the greatest catalytic action at temps. near  $0^\circ$ . The blood catalase is nearly all destroyed between  $45^\circ$  and  $50^\circ$  and partially destroyed at  $-14^\circ$ .

J. F. LYMAN

**Injury, recovery and death.** W. J. V. OSTERHOUT. *Proc. Am. Physiol. Soc., Am. J. Physiol.* **59**, 443(1922).—Measurements of elec. cond. show that after short exposure to a toxic soln. tissue recovers completely when returned to the normal environment. After a longer exposure recovery is incomplete. This does not appear to be due to death of some of the cells but to a permanent lowering of the resistance of all of the cells. J. F. LYMAN

**The absorption curve of hemoglobin and carbon dioxide.** G. A. BUCHMASTER. *Proc. Physiol. Soc., J. Physiol.* **54**, xcii(1921).—Solns. of hemoglobin behave toward  $\text{CO}_2$  according to the Dalton-Henry law. Between 40 and 60 mm.  $\text{CO}_2$  pressure, solns. of the hemoglobin absorb considerable amts. of  $\text{CO}_2$ , the gas being lost rapidly on exposure to lower pressures. J. F. LYMAN

**The decomposition of carbonates by acidic caseinogen.** J. MELLANBY. *Proc. Physiol. Soc., J. Physiol.* **54**, cxx(1921).—Casein pptd. from milk by  $\text{HCl}$  and washed until free from  $\text{Cl}$  readily dissolves in  $\text{CaCO}_3$  or  $\text{Na}_2\text{CO}_3$  with the evolution of  $\text{CO}_2$ . Approx. 2200 g. acid caseinogen liberates a g. mol. of  $\text{CO}_2$ . A soln. of acidic caseinogen in  $\text{CaCO}_3$  evolved no  $\text{CO}_2$  on the addition of  $\text{H}_2\text{SO}_4$  *in vacuo*, but after exposure to alveolar air it contained 18%  $\text{CO}_2$  by vol. J. F. LYMAN

**Shift of the absorption spectra of oxy- and carbon-monoxide-hemoglobin with change of temperature.** H. HARTRIDGE. *Proc. Physiol. Soc., J. Physiol.* **54**, cxxxviii(1921).—The absorption bands of both oxy- and CO-hemoglobin shift toward the red with rise of temp., the movement per degree being about 0.28 Å. U. The cause of this phenomenon seems to be some intramol. change in the compds. J. F. L.

**The solution of casein by sodium carbonate—an example of reversible coagulation.** J. MELLANBY. *Proc. Physiol. Soc., J. Physiol.* **54**, cxvi(1921).—Casein, prepd. by the action of neutral rennin on milk, readily dissolves in 0.2%  $\text{Na}_2\text{CO}_3$  without the evolution of  $\text{CO}_2$ . The addition of  $\text{CaCl}_2$  to the soln. gave a typical coagulum comparable to that produced in milk by rennin. M. considers that during the coagulation of milk by rennin the emulsoid colloid, caseinogen, is changed to the suspensoid colloid, paracasein and this suspensoid is pptd. by  $\text{Ca}$  ions in milk. The resoln. of paracasein by  $\text{Na}_2\text{CO}_3$  is effected by the removal of the  $\text{Ca}$  ions from the paracasein particles and recoagulation is obtained by adding an excess of  $\text{Ca}$  salt to the redissolved paracasein. J. F. L.

**Correlation of heredity with biochemistry and physical chemistry.** G. MARINESCO. *Rev. sci.* **60**, 321-9(1922).—An address dealing with the possible role of the various oxidizing enzymes and of the cytoplasmic mitochondria in the transmission of inherited factors. M.'s histochem. researches on oxidases are quoted (cf. *C. A.* **14**, 3435, 3454). W. A. P.

**Influence of various antiseptics on the activity of lipase.** L. S. PALMER. *J. Am. Chem. Soc.* **44**, 1527-38(1922).—The influence of  $\text{HCHO}$ ,  $\text{CHCl}_3$ ,  $\text{Me}_2\text{CO}$ ,  $\text{CHI}_3$  in  $\text{Me}_2\text{CO}$ ,  $\text{CHI}_3$ ,  $\text{I}$ ,  $\text{Br}$ ,  $\text{HgCl}_2$  and  $\text{CCl}_3\text{CH}(\text{OH})_2$  on the hydrolysis by lipase of butter fat emulsions was studied. The results with  $\text{HgCl}_2$  and  $\text{CCl}_3\text{CH}(\text{OH})_2$  are not reported in detail;  $\text{HgCl}_2$  inhibited lipase activity completely in 0.1-0.3% concns. and  $\text{CCl}_3\text{CH}(\text{OH})_2$  not only retarded the lipase but failed as a germicide when cow's milk was used as substrate. In general the substrate used was an artificial "acacia milk" prepd. by grinding acacia in  $\text{H}_2\text{O}$  and slowly adding melted butter fat; it contained 4.00% fat and had a  $p_{\text{H}}$  of approx. 5.0. Usually the enzyme was com. steapsin in  $\text{H}_2\text{O}$  suspension. Some expts. with a glycerol ext. of pig's pancreas as the source of enzyme and cow's milk as substrate were unsatisfactory because the proteases in the enzyme prepn. acted on the proteins of the milk; these expts. showed that it is apparently not possible to prevent proteolytic activity effectively by antiseptics without at the same time interfering with lipase activity if the substrate contains both protein and fat. In making the detns. aliquots of the solns. were added to 4 vols. of  $\text{Me}_2\text{CO-Et}_2\text{O}$  (3:1) and titrated with alc.  $\text{KOH}$ , this giving much more satisfactory results than aq.  $\text{KOH}$ .  $\text{HCHO}$  up

to 1 part in 250 was found to have no detrimental effect on the activity of the lipase, 1% solns. being required to produce a retardation of the enzyme.  $\text{CHCl}_3$  in 1.5-2.5% concns. retarded the lipase activity 20-60%,  $\text{Me}_2\text{CO}$  in 6-12% concns. retarded it 12-26%.  $\text{CHI}_3$  (0.3%) in fresh 3%  $\text{Me}_2\text{CO}$  soln. retarded the lipolysis 25-40%; with similar  $\text{Me}_2\text{CO}$  solns. which had stood some time, practically complete inhibition was obtained with this and even smaller concns. of  $\text{CHI}_3$ .  $\text{CHI}_3$  alone retards the lipase action in direct proportion to its concn. (from 15% retardation with 0.03%  $\text{CHI}_3$  to 55% retardation with 0.5%  $\text{CHI}_3$ ). Old solns. of  $\text{CHI}_3$  in  $\text{Me}_2\text{CO}$  contain free I which also has a marked effect on lipase activity, completely inhibiting lipolysis at concns. of 0.045% and more. Br water behaves like I but higher concns. of Br are required (93-4% retardation with 0.25% Br). The results with  $\text{HCHO}$  and the halogens indicate that lipase is not of a protein nature but rather has an unsatd. aliphatic structure.

C. A. R.

**Action of urease in the animal organism.** ALFRED LUBLIN. *Arch. expl. Path. Pharm.* 92, 280-7(1922).—Urease or urea injected separately into rabbits or mice causes no marked disturbance, but the simultaneous injection of the two substances is followed by death.

G. H. S.

**Physical-chemical investigation of the nervous system. I. Swelling and double-refraction of the medullary sheath.** E. A. SPIEGEL. *Arch. ges. Physiol.* (Pflüger's) 192, 225-39(1921).—Double refraction is a function of the living nerve and changes in this property reflect changes in other phys. properties, such as the pressure within the myelin sheath. Swelling is accompanied by a reduction in anisotropy. The swelling, and accompanying changes, due to acids or hypotonic solns., are not associated primarily with changes in  $pH$ . II. The effect of narcotics on the anisotropy of the nerves. *Ibid* 240-54.—The lipid-sol. narcotics decrease the anisotropy of the tissue. The change is readily reversible and can be observed in the living nerve during narcosis.

G. H. S.

**Ionic theory of stimulation. Stimulation of the auditory organs. II. Ionic theory of stimulation and Pflüger's law.** P. LASAREV. *Arch. ges. Physiol.* (Pflüger's) 193, 1-6, 231-5(1922).—A purely math. treatment of the subjects indicated by the titles. III. Taste stimuli. *Ibid* 194, 293-7(1922).—A math. treatment of the theory of ionic stimulation as applied to taste, supported by exptl. data bearing upon taste reactions to  $\text{NaCl}$ , saccharin, and sugar solns.

G. H. S.

**Does peptic digestion in the frog differ from that in warm-blooded animals?** HELMUT MÜLLER. *Arch. ges. Physiol.* (Pflüger's) 193, 214-24(1922).—The pepsin from the frog stomach acts precisely like that from warm-blooded animals, concn. and temp. effects being essentially the same.

G. H. S.

**The occurrence of urea in nature.** E. A. WERNER. *Dublin J. Med. Sci.* [4] 1922, No. 23, 577-94.—A discussion of the distribution of urea throughout the animal and vegetable kingdoms, together with a consideration of the general laws of metabolism and urea formation and elimination.

G. H. S.

**The evolution of chemical terminology. II. Phototropism. Organotropism (COUCH) 2.**

## B—METHODS AND APPARATUS

STANLEY R. BENEDICT

**Spectrographic changes of coloring matter in the blood through some organic and inorganic poisons, and the spectral properties of egg yolk and urobilin.** L. LEWIN AND E. STRANGER. *Z. wiss. Phot.* 21, 221-6(1922).—Solns. of blood treated with  $\text{Ph-NHNH}_2$  developed new spectral lines, but no change in the hemoglobin spectrum could be detected in the presence of  $\text{HCN}$ ,  $\text{PH}_3$ , or  $\text{SO}_2$ . With  $\text{SO}_2$  the line of the decompn.



product hematin was obtained. The absorption spectrum of urobilin and egg yolk was obtained, differentiating the latter from all substitutes. G. R. FONDA

**A cause of error in applying the color test for acetone.** ANTONIO TROISE. *Ann. chim. anal. chim. appl.* **4**, 177-8(1922).—In testing urine for acetone with Na nitroprusside and  $\text{NH}_3$  a violet color was obtained although there was no reason to suspect the presence of acetone in the urine. Phenolphthalein is the only substance recognized as likely to interfere with the test but the sick person had not taken any of this. After studying the prescriptions used for the patient, it was found that Bayer's *istycine I* (dihydroxyanthraquinone) was the cause of the trouble. Distn. tests showed that no acetone was present in the urine. W. T. H.

**Microchemical detection of tryptophan in plants.** F. KREYZ. *Biochem. Z.* **130**, 86-98(1922).—Sections which have been fixed either in a 2 to 5% formalin soln. for  $\frac{1}{2}$  hr. and washed for 2 hrs. in  $\text{H}_2\text{O}$ , or in a 2%  $\text{HgCl}_2$  soln. for 10 to 15 mins. are placed for 3 to 5 seconds in a  $\text{H}_2\text{O}$  soln. of  $\text{Na}_2\text{SiO}_3$  (d. 1.10). They are then placed in distd.  $\text{H}_2\text{O}$  for 1 to 2 seconds and transferred to Furth's modification of Voisent's reagent (*Biochem. Z.* **109**, 103(1920)) composed of 1 drop of 2%  $\text{HCHO}$  soln., 1 drop of fresh 0.5%  $\text{NaNO}_3$  soln. and 10 to 15 cc.  $\text{HCl}$  (d. 1.19). The characteristic violet color reaches its max. in 10 to 15 mins. The section is then mounted in paraffin oil and best studied by electric light. The  $\text{Na}_2\text{SiO}_3$  is pptd. as colloidal  $\text{H}_2\text{SiO}_3$  by the  $\text{HCl}$  and the structure of the tissue is preserved. By this test tryptophan was found in plants such as sporangia, algae and some cormophytes. In the higher plants it is found in considerable amt. in the embryonic tissues. The radial elements and the vessel bundles also contain the compd. while it is not present in the ground or supporting tissue. All the protein cell constituents such as the nucleus, nucleolus, protoplasm, aleurone granules, protein crystals and the stroma of the chloroplasts contain tryptophan. F. S. HAMMETT

**The differentiation of proteins and their products by means of color reactions.** M. A. RAKUSIN. *Biochem. Z.* **130**, 268-81(1922).—A comprehensive discussion and exptl. review. The reactions are grouped in 3 general classes: the reactions due to N, those due to carbohydrate and those due to S. Each protein yields a quite characteristic complex of reactions. Exptl. studies show that *chondroitinsulfuric acid* can be obtained pure. F. S. HAMMETT

**A modification of the micro-respiration apparatus.** B. KRAJNIEK. *Biochem. Z.* **130**, 286-93(1922).—Description of a new app. having several advantages. The article is not suited for abstracting. F. S. HAMMETT

**Test for blood with Fuld's rhodamine reagent in legal medium.** R. ALKE. *Deutsches Z. ges. gerichtl. Med.* **1**, 52-9(1922); cf. *C. A.* **11**, 2213.—Rhodamine is similar to phenolphthalein in its chem. reactions as in its structural formula. It gives a red color in the presence of blood which in great diln. is more blue-red. Its sensitivity is 1:100,000 and the reaction runs roughly parallel to the amt. of blood present. Nevertheless Fuld's reagent is not specific. F. S. HAMMETT

**The ashing of the dead for the forensic detection of poisons. II. The sterilization of the body parts.** F. LIPPICH. *Deutsches Z. ges. gerichtl. Med.* **1**, 217-27(1922).—Horse, or ox blood in various stages of putrefaction was mixed with exactly weighed amts. of the poison to be detd. and sterilized by heat at 90-100° for 1 to 3 hrs. and an attempt at recovery of the added compd. made. Tables are given of the results obtained. *Ibid* 268-83.—This paper gives the results of a similar study with sterilization by freezing. Both methods are applicable under different conditions and with different poisons which are thoroughly discussed. F. S. HAMMETT

**An improvement of the micro-Kjeldahl method for blood.** R. STEINBACH. *Z. Biol.* **75**, 219-20(1922).—S. substitutes little cups of tin foil for the filter-paper used by Bang, thus cutting down the time necessary for digestion. F. S. HAMMETT

**Estimation of non-protein nitrogen in blood.** ERIC PONDER. *Biochem. J.* **16**, 368-9(1922); cf. Cole, *Practical Physiological Chemistry* 1919, p. 260 and O. Folin, *A Laboratory Manual of Biological Chemistry* 1919, p. 179.—The innovation consists in the use of a micro-filtration app. (*C. A.* **15**, 2893). BENJAMIN HARROW

**Estimation of calcium in blood.** A. R. LING AND J. H. BUSHILL. *Biochem. J.* **16**, 403-6(1922).—The method used is based on the methods of McCrudden (*C. A.* **4**, 1493), Halverson and Bergeim (*C. A.* **12**, 488), and de Waard (*C. A.* **14**, 1550). The Ca, pptd. as oxalate, is finally cst'd. by titration with  $\text{KMnO}_4$ . BENJAMIN HARROW

**Biochemical method.** A. HARDEN. *J. Soc. Chem. Ind.* **41**, 80R(1922).—An address devoted to the properties of enzymes and vitamins, and the methods used in their study. JOSEPH S. HERBURN

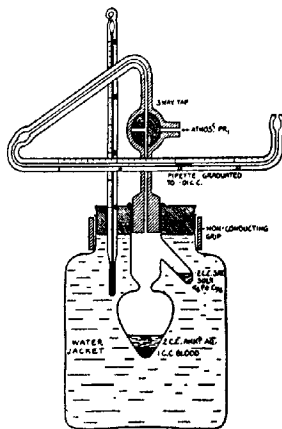
**Diagnostic chemistry as a routine function of a state laboratory.** S. DEM. GAGE AND EDITH EARLE. *Am. J. Public Health* **12**, 665-9(1922). E. H.

**The method of mixtures as applied to the calibration of instruments for measuring the carbon monoxide in blood.** H. HARTRIDGE. *Proc. Physiol. Soc., J. Physiol.* **54**, xlii(1921).—The method of mixts. employed by Van Slyke and Salvesen for testing the accuracy of their gas analysis method of cstg. CO in blood (*C. A.* **14**, 957) is regarded by H. as unreliable. J. F. LYMAN

**A clinical method for the quantitative determination of the creatinine-creatinine content of urine.** D. BURNS. *Proc. Physiol. Soc., J. Physiol.* **54**, xlvii(1921).—The principal feature of the method is the use of Haldane hemoglobinometer graduated tubes for colorimeter tubes. 0.5 N  $\text{K}_2\text{Cr}_2\text{O}_7$  soln. is used as the standard. J. F. LYMAN

**A simplified blood gas volumeter for the use of students.** D. T. HARRIS. *Proc. Physiol. Soc., J. Physiol.* **54**, lxxii(1921).—The vol. of  $\text{O}_2$  necessary to sat. 1 cc. venous blood is det'd. by adjusting the app. as shown in the cut. The app. is then agitated so that the dil.  $\text{NH}_4\text{OH}$  (0.5%) and blood are mixed and the laked blood is spread out in a thin layer over the sides of the pear-shaped bulb. The %  $\text{O}_2$  absorbed is read directly by noting the no. of divisions through which the Hg in the graduated pipet moves. The  $\text{O}_2$  capacity of the same blood is det'd. by inclining the app. so that the  $\text{K}_3\text{Fe}(\text{CN})_6$  in the side tube comes in contact with the blood. The  $\text{O}_2$  evolved is det'd. by the excursion of the Hg in the pipet.  $\text{O}_2$  content of venous blood =  $\text{O}_2$  capacity— $\text{O}_2$  necessary to saturate venous blood. The  $\text{CO}_2$  content of the same blood can be det'd. by adding tartaric or lactic acid instead of  $\text{K}_3\text{Fe}(\text{CN})_6$  from the side tube.

J. F. LYMAN



**A simple method for the detection of nitrogen in physiological fluids.** H. E. ROAF. *Proc. Physiol. Soc., J. Physiol.* **56**, ii(1922).—On heating a liquid containing N compds. of animal origin with alk.  $\text{KMnO}_4\text{NH}_3$  is given off. J. F. LYMAN

**An electrical method (katharometer) for measuring the carbon dioxide in respired gases.** A. V. HILL. *Proc. Physiol. Soc., J. Physiol.* **56**, xx(1922).—The instrument

used was invented by Shakespear (*C. A.* 13, 1550). The form adopted for detn. of  $\text{CO}_2$  in flue gases serves admirably for the measurements of  $\text{CO}_2$  in respired gas.

J. F. L.

**An automatic recorder of oxygen consumption.** E. SCHUSTER. *Proc. Physiol. Soc., J. Physiol.* 56, xxv(1922).—This app. consists of (1) a water-sealed spirometer with a wedge shaped cap, (2) a pump which, when in action, delivers a known amt. into the spirometer at each stroke, (3) mechanism for driving the pump. The exptl. subject inspires from the spirometer, the expired air returning to the spirometer after passing through absorbers of soda-lime. When the spirometer cap falls to a certain point a circuit in an electromagnet is closed; this starts the pump which forces  $\text{O}_2$  into the spirometer. The amt. of  $\text{O}_2$  can be measured by recording the strokes of the pump or by recording the excursions of the spirometer cap up and down.

J. F. LYMAN

**The gasometer method of indirect calorimetry for dogs.** W. M. BOOTHBY AND F. C. MANN. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 464-5(1922).—Expired air is collected in a gasometer and the gas analyzed by the Haldane app. A breathing mask for dogs is described. B. and M. consider the gasometer method of more general application and technically easier than the closed circuit box method of measuring respiratory exchange.

J. F. LYMAN

**Obtaining the coagulation enzyme from blood serum.** MAX BLEIBTREU. *Arch. ges. Physiol. (Pflüger's)* 194, 318-22(1922).—Modifications of the method of Bleibtreu and Atzler for the prepn. and testing of the coagulation enzyme from blood serum are described.

G. H. S.

**Biologic determination of the calcium of the blood in spasmodophilia and after the administration of calcium.** THEODOR GEUSSENHAINER. *Z. Kinderheilk.* 32, 215-26 (1922).—With the frog heart as an indicator the relative amts. of Ca in the serum were detd. By this technic relatively small changes in the concn. of Ca ions in the blood could be detected after the administration of Ca in cases of spasmodophilia.

G. H. S.

**A simplified air analysis apparatus (HARRIS) 1.** Apparatus for determination of the gases in blood and other solutions (VAN SLYKE) 1.

## C—BACTERIOLOGY

A. K. BALLS

**The presence of nucleic acid in bacteria.** A. J. SCHAEFFER, CASPAR FOLKOFF AND S. BAYNE JONES. *Bull. Johns Hopkins Hosp.* 33, 151(1922).—A nucleic acid, containing guanine and P, half of which is easily split off and half firmly bound, but no pentose, was obtained from *B. coli*.

I. GREENWALD

**The effect of slight increases of temperature on the bacteriostatic power of gentian violet.** J. W. CHURCHMAN. *Bull. Johns Hopkins Hosp.* 33, 227-9(1922).—A strain of *B. coli*, which grew well on agar after exposure to gentian violet at room temp. for 1 hr. or after exposure for 1 hr. at  $50^\circ$  without gentian violet, would not grow after exposure to gentian violet at  $50^\circ$  for 1 hr.

I. GREENWALD

**The elective action of tellurium salts upon bacteria of the colontyphoid group.** G. JOACHIMOGLU. *Z. Urol.* 16, 97-100(1922).—Telluric acid in concns. of 1-40,000 has an elective inhibitive action on the growth of *B. coli* and *B. typhosus* in cultures. It is suggested that this substance be used in colon bacillus infections of the urinary tract.

E. B. FINK

**The stimulating effect of charcoal suspensions and other substances of great surface development, such as colloidal silicic acid, ferrous phosphate, and agar-agar, on the formation of gases of fermentation by *Bacillus coli* in protein-free media.** R. LABES. *Biochem. Z.* 130, 1-13(1922).—The N-free nutrient media used by L. contained from 3 to 0.3% glucose 0.01%  $\text{MgSO}_4$ , 0.18% NaCl, 0.075% KCl, from 0.63

to 0.063% ammonium lactate, or  $\text{NH}_4\text{Cl}$ , urea or asparagine, and 0.01%  $\text{CaCl}_2$ . The  $p_{\text{H}}$  was regulated as desired by the requisite amts. of  $\text{NaH}_2\text{PO}_4$  and  $\text{Na}_2\text{HPO}_4$  so that the total quantity of phosphate reached  $\frac{1}{18}$  molar. Extensive tables give the results of the study which demonstrated that the suspension of finely divided substances such as charcoal, colloidal silica and ferrous phosphate markedly stimulate gas formation by *B. coli* in protein-free media. This stimulation occurs equally well in slightly acid and slightly alk. solns. The effectiveness is considered as due to the large surface development with its concomitant adsorption processes. In this way the unfavorable satn. of the medium with the gases from the fermentation is prevented since they unite into bubbles on the surfaces of the suspended material.

F. S. HAMMETT

**The formation of bacterial toxins. II. Diphtheria toxin.** L. E. WALBUM. *Biochem. Z.* 130, 25-67(1922); cf. *C. A.* 16, 2708.—These extensive studies indicate that there is a seasonal periodicity of some sort in the toxin productivity of the diphtheria bacillus the importance of which with respect to the obtaining of adequate products is concisely stressed. More particularly it is shown that the organism will grow between  $20^\circ$  and  $42^\circ$  with an optimum around  $34^\circ$ ; that it will grow from a  $p_{\text{H}}$  of 5.2 to one of 8.9 but that the optimum lies around  $p_{\text{H}}$  7.0. If the temp. is unfavorable the optimum  $p_{\text{H}}$  tends towards the alk. side. The film formation begins the earliest in cultures with an initial  $p_{\text{H}}$  of 7.5 and also reaches its max. the soonest (3 days). In cultures of  $p_{\text{H}}$  6.8 the full strength is not obtained and gradually becomes more dil. with increasing acidity. The film formation in alk. cultures almost coincides with the growth limits. The alkalinity of the cultures increases during the course of 20-25 days to  $p_{\text{H}}$  = 8.5 or 8.7. Diphtheria toxin is destroyed after 6 days at  $37^\circ$  if the soln. is more acid than  $p_{\text{H}}$  = 5.5 or more alk. than  $p_{\text{H}}$  = 9.3 to 10.0. The optimal  $p_{\text{H}}$  for preservation of the toxin is between 7.2 and 7.6. The weakening which occurs at  $p_{\text{H}}$  7.4 is almost the same in fresh and old toxin solns. It was found that if the initial  $p_{\text{H}}$  > 7.2 the culture always remained alk. and if the  $p_{\text{H}}$  was < 6.6 the culture always remained acid. Cultures at an initial  $p_{\text{H}}$  between the 2 may go one way or the other. Significant toxin formation was found in cultures at  $p_{\text{H}}$  = 6.7-6.8. The velocity of toxin formation is at its peak when the initial  $p_{\text{H}}$  is the highest. The temp. optimum of the toxin formation is  $36^\circ$ ; the  $p_{\text{H}}$  optimum is 7.2. Calf muscle bouillon with peptone is considered the best medium for toxin production. To this is added 0.2% sucrose and 0.5% NaCl. The peptone concn. is 1.5%. Sterilization should be done before alkalization. The temp. duration and  $p_{\text{H}}$  are important factors during sterilization. The addition of a few drops of a 0.01 molar soln. of  $\text{MnCl}_2$  often increases toxin production.

F. S. HAMMETT

**Conditions influencing the formation of fat by the yeast cell.** I. S. MACLEAN. *Biochem. J.* 16, 370-9(1922).—Normal yeast contains but small quantities of free fat, but this is increased in abnormal conditions. Much of the fat is in combination (with protein and carbohydrate?) and cannot be extd. with alc. and ether unless first decomposed by boiling with dil. mineral acids. Plenty of oxygen and carbohydrate increase the quantity of fat, which is, however, held in combination almost entirely.

BENJAMIN HARROW

**Acquired tolerance—specific, simultaneous, and alternate—of the lactic acid organism for poisons.** CHARLES RICHET, EUDOXIE BACHRACH AND HERNY CARDOT. *Compt. rend.* 174, 345-51(1922).—Study was made of the acquired tolerance of the lactic acid organism for certain metallic poisons:  $\text{K}_2\text{AsO}_4$ ,  $\text{CdCl}_2$ ,  $\text{TiNO}_3$ . The hereditary tolerance for a poison was found to be specific, i. e., limited to the poison to which the bacterial strain had become accustomed. The organisms could acquire a tolerance simultaneously for 2 poisons both of which were present in the medium. In certain cases, at least, the tolerance was acquired as readily and as completely when both poisons were present as when only one of them was used. When the organisms were

grown alternately for several times, first on a medium containing one of the 2 poisons, then on a medium containing the other poison, the tolerance for each poison was acquired but to a lesser extent than if exposure to a given poison had been continuous.

J. S. H.

**Formation of carbolic acid during putrefaction.** J. S. MACLAURIN. *Analyst* 47, 294-5(1922).—Untreated sheep kidneys on putrefaction produced amts. of PhOH varying from a trace to 0.022%. Kidneys inoculated with a broth contg. *B. coli*; *B. lactis aerogenes*, Friedlander's bacillus, *B. mucosus capsulatis* and Morgan's bacillus produced 0.01-0.028% PhOH.

E. H.

**Classification of sarcinae on the basis of their cultural and morphological behavior on various nutrient media.** K. BOERSCH. *Z. ges. Brauw.* 1921, 186-8. J. S. C. I.

**Comparison of the antiseptic value of cresol in aqueous and in soap solutions.** B. LANGE. *Z. Hyg. Infektionskrankh.* 94, 82-106(1921).—The improvement in the antiseptic action of cresol by the addn. of soap depends on the use of a suitable soap (e. g., potash-linseed oil soap) and the correct cresol:soap ratio. The relative improvement is more apparent in dil. solns. (0.2-0.4%) than in more concd. ones. In the action on strong bacterial growths no advantage was observed in the use of soap. It is pointed out that no method of detg. antiseptic values is suitable for all purposes—different substances requiring different methods of evaluation.

J. S. C. I.

**The changes in hydrogen-ion concentration coincident with the growth of *Bacterium tumefaciens* and other plant pathogens.** W. H. CHAMBERS. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 287(1921).—*Bacterium tumefaciens*, grown in botillon, shows a greater alk. production than do *B. solanacearum* and *Bacterium campestris*.

J. F. L.

**The proteolytic enzyme of *Bacillus pyocyaneus*: The inhibition produced by normal and immune serum.** C. E. DUKES. *J. Path. Bact.* 25, 258-65(1922).—Antiferments are not produced against the proteolytic enzymes of *B. pyocyaneus*. The inhibition found in immune serum by some methods of testing appears to be due to the action of a precipitin.

JOHN T. MYERS

**The bacteriophages.** J. MAISEN. *Arch. intern. pharmacodynamie* 26, 215-45(1922).—By means of a special technic it is possible to adapt the same bacteriophage to react with at least 2 strains of bacteria. By being in continuous contact with one of these strains the bacteriophage may become specially lytic towards this strain and lose its lytic power for the other strain. Conversely a bacterial strain resistant to one bacteriophage is also resistant to another. Bacteriophages appear inactive towards bacteria killed in various ways. Antibodies obtained by immunization of animals with any bacteriophage are non-specific and have the power to neutralize other lytic agents. Resistant strains vary in their power to carry along with them the lysogenic property. Some strains do not contain the bacteriophage, while others lose it rapidly and do not regain it. Some resistant strains, if grown on solid media in presence of antilytic serum, may lose their resistance and become normal. The bacteriophages are considered to be nitrogeous colloids. The virus theory of d'Herelle is supported (cf. C. A. 15, 3319-20).

W. A. PERLZWEIG

**The bacteriophage virus of d'Herelle.** OSKAR BAIL. *Wiener klin. Wochschr.* 34, 237-8(1921).—A review of recent French work on bacteriophages.

W. A. P.

**A wild yeast which causes turbidity in beer (CHRISTOPH 16.** Bacteria as consumers of alcohol in beer and other alcoholic liquids (LINDNER) 16.

#### D—BOTANY

B. M. DUGGAR

**Nutrient solutions for wheat.** W. E. TOTTINGHAM AND E. J. RANKIN. *Am.*

*J. Botany* 9, 270-5(1922).—The optimal nutrient conditions, as regards  $p_H$  values, appear to differ as between the germination phase and the later growth of wheat. Livingston's and Tottingham's soln.  $R_3C_1$  (*C. A.* 12, 1890), when adjusted to a  $p_H$  value of 7.5, gives far better root development than at  $p_H$  6.4 or 5.3. H-ion concns. endured by the plant in intermittently renewed solns. become unendurable when the soln. is continuously renewed, owing probably to the ability of the plant to reduce the H-ion concn. of the former. In continuously renewed solns.  $p_H$  7.5 exceeds  $p_H$  6.4 on the basis of elongation of the plants, but the lower  $p_H$  values lead to greater production of dry matter.

P. R. DAWSON

**Recent advances in science—Plant physiology.** WALTER STILES. *Science Progress* 16, 554-9(1922).—Review of recent work on osmotic pressure in plants. J. S. H.

**The penetration of dyes into living cells.** M. IRWIN. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 458(1922).—The cell of *Nitella* is so large that the sap can be squeezed out of a single cell and examd. colorimetrically; hence the rate of penetration can be studied.

J. F. LYMAN

**Comparative studies on respiration. XXI. Acid formation and decreased production of carbon dioxide due to ethyl alcohol.** MARIAN IRWIN AND MARGARET WEINSTEIN. *Am. J. Botany* 9, 277-82(1922).—EtOH decreases the production of  $CO_2$  by radishes and brings about the formation of org. acids. **XXII. The effect of lactic acid on the respiration of wheat.** EDITH P. SMITH. *Ibid* 307-10.—In high diln. such as 0.0025 *M*, lactic acid first accelerates and then decreases the rate of production of  $CO_2$  by wheat seedlings. As the concn. of the acid increases the preliminary rise in rate becomes less marked until a concn. is reached when the rate begins to fall. Even if the rate has been rapidly reduced to 25% of the normal by 2 *M* lactic acid, recovery is possible and appears to be complete. The effects are due to some specific action of the lactic acid and not merely to osmotic pressure or to acidity.

J. J. SKINNER

**The effect of transpiration on the absorption of salts by plants.** W. C. MUENCHER. *Am. J. Botany* 9, 311-29(1922).—In these expts. barley was grown for 5 weeks in Knap's soln. in quart jars under conditions of high and low transpiration. Transpiration was reduced by increasing the atm. humidity, reducing the light intensity, and increasing the concn. of nutrient soln. With a uniform concn. of nutrient soln. the total ash content of barley plants varied but slightly even if the transpiration was reduced to less than one-half by increasing the atmospheric humidity. The ash content was reduced when transpiration was reduced by shading, thus reducing its photo synthetic activity. When transpiration was reduced by increasing the concn. of the soln. the ash content was only slightly reduced. These results do not support the theory that transpiration has an important role in supplying plants with nutrient salts. The data seem to indicate that the amt. of food available is an important factor in detg. the amt. and rapidity with which the essential salts enter the plant.

J. J. SKINNER

## E—NUTRITION

PHILIP B. HAWK

### NORMAL

**Flour prepared for infants.** E. GORTER. *Nederland. Maandschr. Geneeskunde* 10, 229-42(1921).—The article is intended as a popular propaganda against the misuse of commercial flour preps. intended for infants. These consist of starch and are quite insufficient for nourishing babies. The flour not only lacks protein, fat and salts, but also vitamins A and B. This is illustrated by expts. on animals.

R. BRUTNER

**Simple diets deficient in fat-soluble factor A. Importance of the albuminoid material employed.** H. PÉNAU AND M. SIMONNET. *Bull. soc. chim. biol.* 4, 192-205(1922).—Peptone prepd. by pancreatic digestion of beef, filtration, and desiccation

in vacuo, after extrn. with  $\text{Et}_2\text{O}$  is deficient in cystine, and possibly in other amino acids. Addn. of pure casein supplies the deficiency. Artificial rat diets require the addn. of a small amt. of cellulose (filter paper).

A. T. CAMERON

**Effect of avitaminosis on lactation.** E. WOLLMAN AND M. VAGLIANO. *Compt. rend.* 174, 1637-9(1922).—Continuation of work of McCollum and Simmonds previously reported (cf. C. A. 12, 1658) on effect of diet on vitamin content of milk of lactating mothers. Rats fed on a vitamin-free diet did not produce milk in sufficient quantity or of satisfactory quality to nurse their young successfully. Normal growth of the young rats was obtained by addition of vitamin-free milk, butter, and yeast to the diet of the young rats.

H. J. DRUGL

**Physiological test for the activity of vitamin preparations.** A. SEIDELL. *U. S. Public Health Repts.* 37, 1519-23(1922).—A standardized fuller's earth prepn. of the vitamin product to be tested is used as source of vitamin for pigeons on a polished rice diet after a preliminary period of polished rice and vitamin in doses just sufficient to prevent appreciable loss of weight. The test can usually be completed in two weeks and is very accurate.

H. J. DRUGL

**Cellulose fermentation in the paunch of the ox and its significance for metabolism experiments.** W. KLEIN. *Biochem. Z.* 117, 67-8(1921).—A brief critical discussion of the work and opinions of Krogh and Schmit (C. A. 15, 1556) and of Klein (C. A. 10, 921).

F. S. H.

**The execution of and calculations in metabolism studies with ruminants.** A. C. ANDERSEN. *Biochem. Z.* 130, 143-50(1922).—The article is not suited for satisfactory abstracting in limited space. The calcs. are based on the N content of the urine, the O consumption, the total  $\text{CO}_2$  production and the  $\text{CH}_4$  produced from fermentation.

F. S. HAMMETT

**The relation of vitamin function to calcium metabolism.** K. MIYADERA. *Biochem. Z.* 130, 199-208(1922).—A study of the N and Ca balance in 2 dogs during periods of vitamin-free and vitamin-contg. diets with and without the addition of extra  $\text{CaO}$ . A preliminary mild positive Ca balance obtained on a vitamin-free diet may be enhanced by the addition of vitamins to the food when increased Ca intake is also afforded. Moreover a negative Ca balance is changed to positive under a similar change in diet.

F. S. HAMMETT

**The use of condensed milk in infant feeding. The changes in condensed milks, heated to  $120^\circ$ . Advantages and innocuousness of sweetened condensed milks evaporated at  $50^\circ$ .** G. VARIOT. *Bull. m  m. soc. m  d. h  sp. Paris* 46, 838-44(1922).—The use of condensed milks which have been superheated to  $120^\circ$  lead to scurvy in infants because of destruction of the vitamins.

F. S. HAMMETT

**Some factors modifying the nutrition of children: A survey of 3000 of the most marked cases of malnutrition in Viennese children, made in the summer of 1921.** MADGE R. GRIBBON. *Edinburgh Med. J.* 29, 12-17(1922).—Studies showing the effect on wt., and susceptibility to disease of undernourished children. The size of the family and the position of the child in the family seem to have some influence on the effects of undernutrition in that in the larger family and the last 3 of that family tend to be more undernourished. Prenatal care or house cleanliness apparently had no significant influence.

F. S. HAMMETT

**Undernutrition and hormone action. II. The influence of under-nutrition and thyroid feeding on the oxygen consumption of *Rana temporaria*.** F. GROSSBEILS. *Z. Biol.* 75, 155-68(1922); cf. C. A. 16, 2532.—The  $\text{O}_2$  consumption of normal frog larvae remains absolutely and relatively const. in spite of increasing growth. Normal tadpoles use relatively more, but absolutely less  $\text{O}_2$  than adult frogs. Undernourished animals are stunted. Their metabolism is relatively greater than that of the normal

animals of the same age. Whether this is due to the effects of hunger or the avitaminosis or both factors is not known. Normal nourished thyroid-fed animals have an absolutely and relatively increased  $O_2$  consumption. With decreasing body wt. the  $O_2$  consumption increases. This is due to a disintegration of the protein tissues. Undernourished thyroid-fed frogs have relatively a less  $O_2$  consumption than the normal nourished thyroid-fed animal. The disparity in metabolism between avitaminosis and thyroid feeding is not conditioned by temporal and quant. different developments.

F. S. H.

**Milk as a source of water-soluble vitamin.** T. B. OSBORNE AND L. B. MENDEL. *Biochem. J.* 16, 368-7(1922).—The claim made by Hopkins (*C. A.* 7, 1373; 15, 1556), that 2 cc. of milk suffices to protect young rats from vitamin B deficiency, cannot be substantiated.

BENJAMIN HARROW

**Relation of the fat-soluble factor to rickets and growth in pigs.** JOHN GOLDING, S. S. ZILVA, J. C. DRUMMOND AND K. H. COWARD. *Biochem. J.* 16, 394-402(1922); cf. *C. A.* 15, 3515.—The complete removal of vitamin A from the diet of pigs does not induce rickets, though it does have a marked effect on the development of the animals. In the present series of experiments, animals were deprived both of vitamin A and Ca; no rickets developed.

BENJAMIN HARROW

**Minimum nitrogen expenditure of man and the biological value of various proteins for human nutrition.** C. J. MARTIN AND ROBERT ROBISON. *Biochem. J.* 16, 407-47(1922).—The minimum N expenditure by the urine is somewhat less than 0.038 g. per kg. in one author (Martin) and 0.035 g. per kg. in the other. A diet of carbohydrate and fat causes the nitrogen excreted to fall in a uniform manner. "Bearing in mind the considerable exptl. errors, the ratio body N saved:food N absorbed appears to remain const., whatever amt. of N is taken in the form of whole wheat bread, until equil. is reached. In the case of milk the exptl. errors are proportionately greater and the most we can say is that this ratio may remain const." With gelatin the ratio does not remain const. Thomas' method for detg. the "biological value" of proteins (*C. A.* 4, 1331) holds for bread and perhaps for milk, but does not for gelatin. The mean biol. value of the N contained in the whole wheat grain as detd. by 6 expts. was 35% (Martin) and 31% (Robison); that of the N in cow milk, 55% (Martin).

BENJAMIN HARROW

**Vitamins in the metabolism of yeasts.** H. DAMIANOVICH AND M. A. CATÁN. *Anales inst. modelo clín. med.* 5, 98(1920); *Physiol. Abstracts* 6, 202(1921).—Yeast is used for the detn. of vitamin B; however, the amt. of sugar used by the yeast is detd., instead of counting the number of yeast cells. Vitamin B resists exposure to a temp. of 120° to 130° for 15 min.

JOSEPH S. HEPBURN

**Influence of the vitamins in feeding with cooked meat.** H. DAMIANOVICH AND M. A. CATÁN. *Anales inst. modelo clín. med.* 5, 105(1920); *Physiol. Abstracts* 6, 202(1921).—Dogs succumb if they be fed food which has been cooked for 3 hrs., especially when  $Na_2CO_3$  has previously been added. They survive if beer yeast or autolyzed yeast be added to such food.

JOSEPH S. HEPBURN

**Effects of the study of blood chemistry on dietetics.** WM. FRANKLIN BAKER. *J. Am. Inst. Homeopathy* 14, 1123-9(1922).—Review.

JOSEPH S. HEPBURN

**Are iodides food?** J. F. McCLENDON. *Science* 55, 358-61(1922).—Lack of I in the diet may be a cause of goiter. I may enter the atm. at the seashore as a constituent of the dried spray, be carried inland, be washed from the air by the rain, and thus enter the water supply. A relatively low amt. of sea salt is present in the rain water of the Great Lakes region where goiter is endemic. Sea food, which is comparatively rich in I, is but little used far inland on account of its perishable nature. Evapd. sea water, obtained by evapn. of sea water to dryness and baking the product to insure sterility, is recommended as a dietary salt. It has been used for many months in a goiterous region



as the sole dietary salt of several adults, children and infants; the results have been gratifying. It has also been used with success as the salt ration for generations of animals. Addition of 6 g.  $H_2PO_4$  per l. of sea water prior to evapn. improves the value of the evapd. sea water in certain nutrition expts. on animals and probably in cases of rickets.

JOSEPH S. HEPBURN

**Nutritive importance of beer extract.** H. LÜERS. *Z. ges. Brauw.* 1921, 143-6, 152-3.—Pigeons fed for 35 days solely on polished rice mixed with about 30% of dried beer ext. developed no symptoms of "alimentary dystrophy" (polyneuritis) although they lost wt.; while control pigeons fed on polished rice alone not only lost wt. but became incapable of flying, walking, or holding themselves erect, within 20 days. The beer ext. was obtained by desiccating a 11% dark Munich beer at temps. below 50°.

J. S. C. I.

**Fate of phenylacetyl derivatives of the amino acids in the animal organism.** C. P. SHERWIN AND GEO. J. SHIPLE. *J. Biol. Chem.* 53, 463(1922).—When phenylacetic acid is fed to hens, phenylacetylornithine can be isolated from the excreta and when it is ingested by man phenylacetylglutamine is present in the urine. Various phenylacetyl derivs. of amino acids were fed or injected, dogs, rabbits, chickens and human beings being used. The glutamic glycoch and ornithine compds. were non-toxic when introduced into the organisms where they do not occur as detoxication products of phenylacetic acid. The glutamine compd. undergoes partial hydrolysis into phenylacetylglutamic acid and partial cleavage into phenaceturic acid when fed to the dog. The ornithine compd. undergoes destruction when fed to the dog or human being but apparently not when injected. Phenylacetylalanine, phenylacetylleucine and phenylacetyltyrosine undergo little or no alteration when fed.

A. P. LOTHROP

**Nomographic charts for metabolic rate determinations.** W. M. BOOTHBY AND R. B. SANDIFORD. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 296(1921).—By the use of the charts metabolic rates can be detd. in 3 to 4 mins. from the data obtained by the gasometer method of indirect calorimetry.

J. F. LYMAN

**The results of feeding cottonseed meal and kernels.** I. G. MACY AND N. M. ALTER. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 304(1921).—Rabbits, guinea pigs, pigeons and albino mice were fed cottonseed meal and kernels properly supplemented to meet the requirements of the animal for minerals and for vitamins. The expt. animals declined in wt. and finally died. The macroscopic and microscopic appearance of the tissues is described. Microscopically lesions were found most constantly in the kidneys. Cf. *C. A.* 15, 1558.

J. F. LYMAN

**Metabolism with enemata of dextrose and levulose.** T. M. CARPENTER. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 440-1(1922).—Enemata of dextrose and levulose in human subjects show an absorption of about 20 g. in 3 hrs. The respiratory quotient may rise, thus showing that they are utilized in metabolism.

J. F. LYMAN

**The influence of a beriberi diet upon the metabolic rate of the white rat.** A. GULICK. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 483-4(1922).—The deficient calorie intake must be chiefly responsible for the lowered metabolism noted on the beriberi diet.

J. F. LYMAN

**The influence of cod-liver oil and butter fat on the retention of calcium and phosphorus.** S. V. TELFER. *Proc. Physiol. Soc., J. Physiol.* 54, cv(1921).—The retention of Ca and P in an 8 mos. child was no better on a diet of skim milk + cod-liver oil than on a diet of cows' milk or cows' milk to which butter fat had been added.

J. F. L.

**Nutrition and sports.** J. P. LANGLOIS. *Bull. soc. hyg.* 10, 71-87(1922).—Figures are given to show that the work done in such sports as jumping, rope climbing, fencing,

boxing, and wrestling is so small that no special provision need be made for it in the diet. In the case of sports of long duration such as walking, running (440 yards and over), and swimming (100 yards and over) races, or games (football, tennis, etc.), the work done is very considerable and requires a supplement of food. The additional requirements thus created can be found by detg. the consumption of  $O_2$  or the production of  $CO_2$ . The app. used by L. to carry out these expts. consists of a travelling floor which can be set at any grade from 0-25% (either up or down), and which can be run at 3-30 km. an hr. The subject experimented on carries a Tissot gas helmet modified so as to allow of recovering for an indefinite period of time all the gases exhaled, without inconvenience to the breather. And as the latter always remains in the same place his temp., arterial pressure, etc., can be taken whenever required. It has thus been detd. that 0.5 cal. is required per kg. per m. over and above the requirements of the basic metabolism, when walking on level ground on a good road. On a 5% grade the requirements are increased about 33%, while in plowed soil it is at least doubled. Assuming an av. daily ration equiv. to 3,000 Cal., and allowing for the efficiency of the human machine (max. of about 25-30% for walking), in the case of a 10 or more km. race the ration should be brought to about 5,000 Cal. Such a ration being excessive for the digestive organs, in such a case it becomes necessary to fall back on reserve energy. For sports of short or medium duration, a certain amt. of animal food should be taken; but for long drawn out tests a vegetarian diet (including eggs, milk and butter) should be taken to prevent auto-intoxication. In six-day races the human machine is working under exceptionally high pressure continuously, and requires a continuous supply of fuel: Full course meals are taken about every 3 hrs., supplemented by snatches of food at every chance. No special diet is followed. This constitutes an unexplained anomaly; but it is apparently suitable under the conditions. For the first two days the runner is nervous, and his urine, which is clear at first, clouds up on cooling owing to sepn. of alk. urates, albumin, and phosphates. After the first 48 hrs. the runner steadies down, and the compn. of the urine becomes normal, the amt. being dependent on the amt. and nature of the food taken, showing that in spite of the intensity of the work the organism is still utilizing the food to the best advantage. Wine, etc., is not harmful, but constitutes a rather poor food, as it cannot be transformed into reserve energy to be drawn upon when required. Distd. liquors should not be taken. Milk is valuable after, but should not be taken before or during the ordeal. Owing to its diuretic properties it favors the rapid and excessive elimination of waste products and removes certain ones which, in small doses, exert a stimulating action. A. P.-C.

**The effect of the nature of the diet on the digestibility of butter.** A. D. HOLMES. *Science* 55, 660-4(1922).—Butter is almost completely digested and absorbed when fed to human subjects with a variety of the common foods. W. A. PERLZWEIG

**Biological evaluation of foods.** L. BERCZELLER with J. JACOBSON, I. BILLIG AND ST. DEUTSCH. *Wiener klin. Wochschr.* 34, 507-11, 524-5, 536-8(1921); 16, 2531. —This is a preliminary communication upon an extensive investigation which has been published and abstracted. W. A. PERLZWEIG

**Relation of the internal secretions to metabolism.** J. C. AUB. *J. Am. Med. Assoc.* 79, 95-8(1922).—This address gives a review of recent work. Apparently the 2 glands which most influence the total metabolism are the thyroid and suprarenal. The mechanisms of their actions are independent as either acts without the presence of the other. The theory is advanced that the suprarenals exert acute effects, while the thyroid is the more sluggish regulator of the metabolic rate. L. W. RIGGS

**The distribution of vitamin B.** S. R. DAMON. *J. Am. Med. Assoc.* 79, 128-9 (1922).—This exptl. study was made with young rats weighing 50-75 g., by feeding a

ration known to be deficient in vitamin B, for a period of 14 days during which a pronounced decline was observed. Peptone or beef ext. was then added to the ration in place of a definite amt. of starch and fed 21 days. In no case did the animals recover. Upon supplementing the basal ration with wheat germ the animals quickly resumed normal growth. Com. peptone and beef ext. are devoid of water-sol. vitamin B.

L. W. ROGGS

Primary changes in eyes of rats which result from deficiency of fat-soluble A in diet. SHINNOSUKE MORI. *J. Am. Med. Assoc.* 79, 197-200(1922).—Histologic methods were used. The eyes of rats on diets deficient in fat-sol. A show xerosis conjunctivae and xerosis corneae (xerophthalmia). Xerosis is the essential change and is caused only by the dryness of the tissue. The ulcers of the cornea are secondary and are due to secondary infection by microorganisms.

L. W. ROGGS

Vitamin problems. A. HARDEN. *Nature* 110, 14-6(1922).—A discourse.

W. H. ROSS

Organic foodstuffs with specific action. IX. EMIL ABDERHALDEN. *Arch. ges. Physiol.* (Pflüger's) 192, 163-73(1921).—Along with the changes previously recorded as occurring in pigeons when fed upon polished rice changes in erythrocyte counts and hemoglobin content are noted. The red cell count in such animals may not be more than 50% of the normal value. X. EMIL ABDERHALDEN AND ERNST WÜRHEIMER. *Ibid* 174-82(1921).—The gaseous exchange in nervous and muscular tissues of normal animals and those suffering from dietary deficiencies was compared, together with the influence which the addition of yeast exts. exerts upon these processes. The results indicate that the vitamins influence the respiratory processes. XI. Experiments on pigeons. EMIL ABDERHALDEN. *Ibid* 193, 329-54(1922).—The loss in body wt. of pigeons which were receiving water only was compared with others which received yeast also. In the first group the loss in wt. over a 10-day period averaged 98 g., in the second group the loss averaged 115 g. Thus the loss in wt. was accelerated by the yeast, probably because of an increase in the cellular metabolism. The yeast failed to cause this effect if it had been subjected to heating. The active agent of the yeast is a thermolabile body, not identified with any of the known components. With pigeons on a polished rice diet the heated yeast fails to prevent alimentary dystrophy, although the yeast retains this power if treated with  $\text{CHCl}_3$ , alc., water, or when dried at a low temp. XII. Comparison of the weight and water content of single organs of pigeons fed on polished rice, with and without the addition of yeast, and of starved pigeons. *Ibid* 355-8.—In none of the groups of pigeons did a significant loss, either in total wt. or in water content, occur in the brain, heart, lung, or kidney tissues. The stomach of the starved pigeons showed a slight loss in wt. and water content, and the intestine a very great loss in wt. As a rule the water content of the intestine in birds with dystrophy was greater than that of the normal pigeon but less than that of the starved pigeon. The liver and pancreas lost wt. in all groups, although the loss in water was less marked.

G. H. S.

The vitamin question. L. SIEFFERT. *Schweiz. Apoth. Ztg.* 60, 301-5, 313-9, 329-35(1922).—Feeding expts. on rats with a special malt ext. (M) and "ovomaltine" (O) show the presence of factor B in M, and A + B in O. Adding factor A alone (butter, cod-liver oil) to a vitamin-free diet failed to counteract its effect. The same was noted when factor B alone (yeast) was added. In a vitamin-free diet, the tissues of the animal show marked failure to assimilate  $\text{H}_2\text{O}$ . The diet also clearly affects the young offspring of the animals. An intimate relation exists between lack of vitamins and abnormal metabolism of salts.

S. WALDBOTT

#### ABNORMAL

Studies on experimental rickets. X. Rickets and rickets-like disease produced

in rats by deficient diets. E. V. MCCOLLUM, N. SIMMONS, P. G. SHIPLEY AND E. A. PARK. *Dental Cosmos* 64, 265-73 (1922).—Study was made of the bone lesions produced in rats by rations deficient in Ca, P, and an org. dietary constituent which may or may not be identical with the antixerophthalmic fat-sol. A. Rations low in Ca produced a characteristic lesion which had certain fundamental resemblances to human rickets, yet differed from that disease in certain respects. Rations deficient only in the org. dietary constituent (vitamin) never caused rickets but produced a condition of osteoporosis. Rations deficient in both the vitamin and P, though containing approx. the optimum amt. of Ca required for growth, gave rise to a disease with the fundamental characteristics of human rickets, especially with the lesions of so-called healing rickets. Rations low in both the vitamin and P were supplemented with a complete salt mixt. containing an adequate amt. of P; rickets never developed though keratomalacia or xerophthalmia always occurred, and the bones of the animals became osteoporotic. Rations, deficient in the vitamin and Ca but containing approx. the optimum amt. of P, produced a lesion closely related to if not identical with rickets. Healing occurred, even in animals whose Ca intake was much below the normal, under the influence of cod-liver oil. This oil was much more potent than butter fat to produce healing in rachitic bones and to protect an animal against the disease.

JOSEPH S. HEPBURN

Experimental rickets. XVII. Effects of diets deficient in calcium and in fat-soluble A in modifying the histological structure of the bones. E. V. MCCOLLUM, *et al.* *Am. J. Hyg.* 2, 97-106 (1922).—An unsupplemented ration was prepd. from cereals and legume seeds (wheat, maize, polished rice, rolled oats, peas, navy beans) and was fed to rats from birth (through the mother) or from weaning for periods ranging from 38 to 104 days, with an av. of approx. 71 days. This ration was deficient in Ca, fat-sol. A, and possibly a second fat-sol. dietary essential (vitamin), and, to a lesser extent, in Na, Cl, and P. The rats grew poorly or not at all; their teeth became loose; the incisors broke readily; cavities were present in some of the molars; the eyes were normal; the coat lacked its normal smooth glossy appearance; the thymus was atrophied; the skeleton was abnormal, *e. g.*, the long bones were enlarged at their ends. The histological structure of the bones differed markedly from the normal. The lesions were of a rachitic nature. In some rats the pathological picture was exactly comparable to that of rickets; in other rats it stood midway between rickets and osteoporosis.

J. S. HEPBURN

Relation of food to eczema of children. G. W. BOERICKER. *J. Am. Inst. Homeopathy* 15, 48-51 (1922).—The dietary causes of eczema include simple overfeeding, excess of either fat, protein or carbohydrate in the diet, and food anaphylaxis.

J. S. H.

Changes in the adrenal bodies and the thyroid from inanition. S. VINCENT AND M. S. HOLLNBERG. *Proc. Physiol. Soc., J. Physiol.* 54, lxi (1921).—During the early stages of inanition there is an increase in the amt. of epinephrine in the adrenal bodies, and during the latter stages the amt. of epinephrine is greatly reduced. The thyroids as well as the adrenals hypertrophy during inanition. The colloid normally present in the vesicles of the thyroid almost disappears.

J. F. L.

The effect of starvation on the catalase content. W. E. BURGE AND J. LEICHSENBERG. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 301-2 (1921).—Decreased oxidation during starvation is attributed to the decrease in catalase while the increased oxidation after food is attributed to an increase in catalase.

J. F. LYMAN

Studies in experimental scurvy, with special reference to the antiscorbutic properties of some South African foodstuffs. E. MARIAN DOLF. *Lancet* 1922, I, 576-9.

E. B. F.

The treatment of malignant disease by a diet free from fat-soluble vitamin A. S. WYARD. *Lancet* 1922, I, 840-1.—In no case was any effect of the diet noted on the growth and evolution of the tumor which invariably progressed along the usual lines.

In 58 differential counts made on 25 patients while on the diet free from fat-sol. vitamin A and 7 on 3 similar patients on ordinary diet, no decrease in lymphocytes was noted which was not within the normal limit of variation. It appears, therefore, that the effect reported on rats and mice is not due to lack of this vitamin, or that the effect of vitamin-free diet upon an adult human being differs from that upon these rodents. No bony changes (other than some secondary deposits) were discovered in any of these patients.

E. B. FINE

The after effect of prolonged fasting on the basal metabolic rate. M. KUNDE. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 448-9 (1922).—There seems to be an increase in the basal metabolic rate as the after effect of prolonged fasting (15 days in man and 40 days in dogs). This increase persists for an extended but undetermined period of time.

J. F. LYMAN.

Avitaminosis in children. W. KNÖPFELMACHER. *Wiener klin. Wochschr.* 34, 460 (1921).—A brief summary.

W. A. PERLZWEIG

Case of voluntary fasting. M. LABBÉ, H. STÉVENIN AND FL. NEPVUX. *Bull. mém. soc. méd. des hôsp. Paris* 46, 975-7 (1922).—Report of a man of 42 who in fasting for 36 days lost 14 kg. The arterial pressure was low (8-6) as was the pulse rate (54). The temp. was 35.5° and the blood was highly concd. The urine vol. was about 300 cc. Spontaneous defecation was absent. The N excretion was about 8 g. on the 14th day of the fast. NH<sub>3</sub> excretion increased. An acidosis was present. The basal metabolism before the fast was 43.3 cal. At the beginning it rose to 46.2 and then diminished progressively to 33.3 on the 14th day and to 21.6 on the 22nd day.

F. S. HAMMETT

Relation of diet to pellagra. JOSEPH GOLDBERGER. *J. Am. Med. Assoc.* 78, 1676-80 (1922).—It appears to be established that the diet controls the course and the development of the disease. The relationship thus disclosed probably depends primarily on a specific quality of the amino-acid make-up of the protein supply. Just what amino-acid combination or (within certain limits) combinations of amino acids are primarily concerned, remains for future study to det. The possibility of an as yet unappreciated or an unknown factor (conceivably a vitamin), alone or in combination with the amino-acid factor, is not absolutely excluded.

L. W. RIGGS

Gastric findings in children with anorexia. L. W. SAUER, L. D. MINSK AND W. G. ALEXANDER. *J. Am. Med. Assoc.* 79, 184-6 (1922).—This study deals with the gastric motor and secretory functions of 2 groups of children: (A) 12 normal children with good appetites; (B) 21 more or less under wt. but otherwise normal children with poor appetites. Observations were repeated with a number of subjects of both groups after a few days and after several months. The motor meal consisted of 240 cc. warm milk, 30 g. BaSO<sub>4</sub>, 4 g. sugar and 45 g. white bread without crust. This was fed at 9 A.M. after 15 hrs. fast and serial films were taken 4 hrs. later and each succeeding hr. until the stomach was empty. A few days later a test breakfast consisting of 5 arrowroot crackers, 240 cc. warm water and 4 g. sugar was eaten at 9 A.M. and 1 hr. later the stomach emptied by a Rehfuß tube and the contents were examd. according to Topfer's method. The findings are assembled in 6 tables. Partial summary: For groups (A) and (B) the av. emptying time was 4.5 and 6.1 hrs., resp. The av. total acidity was 61.2 for (A) and 49.4 for 18 of (B), the free HCl was 26.3 and 14.9, resp. In general the conditions shown by group (B) may be improved by proper measures.

L. W. RIGGS

Changes in metabolism after chronic morphinism. FRITZ HILDEBRANDT. *Arch. expil. Path. Pharm.* 92, 68-95 (1922).—Reduction in metabolism and increase in respiratory quotient occur in rats subjected to the repeated injection of morphine just as they develop after thyroidectomy. Apparently a similar mechanism is involved in both cases.

G. H. S.

Some chemical problems as applied to dentistry (EPSTEIN) 17.

## F—PHYSIOLOGY

ANDREW HUNTER

**Thyroid function from a chemical view-point.** A. T. CAMERON. *Can. Med. Assoc. J.* 12, 229-32(1922).—A review. A. T. C.

**Glycogen of the embryonic liver. Determinism of its formation.** M. ARON. *Bull. soc. chim. biol.* 4, 209-22(1922).—The glycogenic function of the mammalian fetal liver commences at a period fixed for the species, but varying from species to species; for cattle earlier than for pigs. This period is concomitant with, and depends upon the development of, the endocrine pancreas, and the appearance (at a stage differing in different species) of islets of Langerhans functionally identical with those of the adult.

A. T. CAMERON

**Source of the amylolytic ferment of the urine.** P. J. CAMMIDGE. *Proc. Roy. Soc. Med.* 15, Sect. Urology 37-9(1922).—The diastase of urine is probably derived from liver or muscle, or both. The content depends on (i) the functional activity of the liver, (ii) the integrity of the pancreatic control (pancreatic lesions or removal of part of the pancreas markedly increases blood diastase) and (iii) the permeability of the kidneys. Hourly measurements of blood and urine diastase allow the excretory power of the kidneys to be estd. and indicate the functional activity of the pancreas and liver.

A. T. CAMERON

**The chemical composition of animal bodies.** J. A. MURRAY. *J. Agr. Sci.* 12, 103-9(1922).—From data obtained by M. in his own expts. and from those of other work he concludes that the relative proportions of fat and non-fatty matter in the animal bodies vary within wide limits but are controlled by feeding. The % of  $H_2O$  in the non-fatty matter varies with the age of the animal in a definite manner in cattle, indications being that the same formula holds for sheep; and, probably, for pigs when slightly modified. The ratio of protein to ash is the same in sheep as in cattle but higher in pigs. Food alone influences this ratio, variation being wider in pigs than in ruminants. The average compn. of the whole body at any stage can be calcd. when the live wt. and % of fat in it are known.

R. B. D.

**Oxidation degradation of dextrose in the animal body.** J. HIRSCH. *Biochem. Z.* 117, 113-6(1921).—A preliminary note largely historical but recording the extn. of a well characterized aldehyde deriv. "aldomedon" from aerated macerated frog muscle tissue, thus demonstrating for the first time that acetaldehyde is a product of animal metabolism of the carbohydrates.

F. S. HAMMETT

**Stomach contents and time of death.** H. MERKEL. *Deutsches Z. ges. gerichtl. Med.* 1, 346-58(1922).—Of medico-legal interest. F. S. H.

**Weight reduction and its remarkable effect on high blood pressure.** R. H. ROSE. *N. Y. Med. J.* 116, 752-5(1922).—Wt. reduction through dietetic adjustment causes improvement in several important symptoms either due to or associated with obesity. The amt. of reduction in blood pressure is much more than can be obtained by drugs. The associated symptoms are greatly diminished. F. S. H.

**The osmotic behavior of the blood corpuscles. III. Changes in the volume of the blood corpuscles in solutions of different osmotic pressure.** R. EGE. *Biochem. Z.* 130, 99-115(1922); cf. *C. A.* 15, 2117.—If the blood corpuscle is to be considered as a type of the Pfeffer cell it is to be expected that the corpuscular vol. in solns. of different osmotic pressure will follow the van't Hoff-Boyle-Marriott law  $P_0V_0 = P_1V_1$ . But when  $V$  is the corpuscular vol. the law does not hold. The expts. reported by E. indicate that the expression should be changed to  $P_0(V_0 + x) = P_1(V_1 + x)$  where  $x$  is the vol. of the disperse phase. This value was detd. in various ways and found to be some 10% greater than the dry matter vol. % of the corpuscles. When  $x$  is interpolated in the equation the exptl. values coincide with the expected values and hence it is evident

that the vol. of the corpuscles is detd. by the osmotic concn. of the external liquid. The small deviations and exceptions are explicable on the basis of a change in degree of dispersion. The corpuscular membrane also exerts a resistance to swelling. IV. The permeability of the blood corpuscles to electrolytes. R. EGG. *Ibid* 116-31.—The velocity of swelling of the red blood corpuscles in  $\text{NH}_4$  salt solns. was measured. The following values were obtained,  $(\text{NH}_4)_2\text{SO}_4$ , 1.0,  $(\text{NH}_4)_2\text{HPO}_4$ , 2.0;  $(\text{NH}_4)_2(\text{COO})_2$ , 2.5;  $(\text{NH}_4)_2\text{CrO}_4$ , 10.8;  $\text{NH}_4\text{NO}_3$ , 10.5;  $\text{NH}_4\text{Br}$ , 13.5;  $(\text{NH}_4)_2\text{CO}_3$ , about 20;  $\text{NH}_4\text{Cl}$ , about 30, as expressing the relative anion permeability velocity. This velocity seems to be dependent on the ion-number, in that the velocity is greatest where the ion-number is the least. There are many exceptions however. V. What is the effect of "diffusible" non-electrolytes on blood-corpuscle volume? R. EGG. *Ibid* 134-5.—Expts. are reported which show that diffusible non-electrolytes such as urea and EtOH have no influence on blood corpuscle vol. as soon as the diffusion equil. is established. VI. The significance of the hydron concentration for blood corpuscle volume. *Ibid* 136-41.—This series of studies shows that changes in hydron concn. of the liquid surrounding red corpuscles have a very significant influence on their vol. The greater the concn. (to  $p_H = 5$ ) the greater the corpuscular vol.; the lower the concn. (to  $p_H = 10$ ) the smaller the vol. The swelling of the corpuscles in the acid solns. follows the law of osmosis and is caused by the increase in osmotically active components which arise within the corpuscles because of the added acid. F. S. HAMMETT

Does the bilateral intrathoracic section of the sympathetic influence gastric secretion? B. ISKIDO. *Biochem. Z.* 130, 151-3(1922).—Only a slight tendency to a diminished secretion was observed. It is probably not significant. F. S. HAMMETT

Respiratory metabolism in alimentary glucemia. A. BORNSTEIN AND K. HOLM. *Biochem. Z.* 130, 209-24(1922).—The blood sugar of fasting man begins to rise a few minutes after the *per oral* administration of 100 g. of glucose and before determinable oxidation of the circulating sugar has begun. This sugar consumption begins from one half hr. to an hr. and a half later, after the blood sugar has reached a high value if not its max. Further oxidation may follow lowered blood-sugar content, and no parallelism exists between the height of the blood sugar and the beginning of the sugar oxidation. When phosphate was given before the sugar no particular effect on the carbohydrate oxidation was observed. When muscular activity is engaged in, the blood sugar rises a bit higher after glucose injection but oxidation does not occur earlier. Simultaneous detns. of serum sugar, serum fat and respiratory exchange showed that the beginning of carbohydrate oxidation after glucose ingestion is not conditioned by the ratio serum-fat : serum-sugar. When 100 g. of *levulose* is ingested by mouth oxidation begins in 5 to 8 mins. while the blood sugar rises but little if any. The opinion is expressed that glucose changes to levulose or a levulose-like compd. before oxidation. If 100 g. of glucose is given to man after a 12 hr. fast the hyperglucemia produced is generally less if a carbohydrate meal has been ingested before the fast than if a fat-protein meal has been eaten. F. S. HAMMETT

The action of placenta extract on salivary secretion. J. KOSAKAR. *Biochem. Z.* 130, 249-251(1922).—Washed placenta was dried for 24 hrs. and then hydrolyzed with 100 cc. concd. HCl (5 times the dried substance) for 8 hrs. at  $100^\circ$ . The HCl was distd. off *in vacuo*, neutralized with NaOH and made up to 200 cc. with  $\text{H}_2\text{O}$ . The ext. prepd. in this way acted as an active salivary stimulant when given intravenously or subcutaneously to dogs. When the dried placenta powder was heated to  $130^\circ$  and then hydrolyzed the stimulating action of the ext. was no longer present. Simultaneous administration of pituglandol with the active ext. did not enhance its activity. F. S. H.

The effect of the sugar concentration on glycogen synthesis. S. EDERER. *Bio-*

*chem. Z.* 130, 204-8(1922).—Liver pulp was incubated at 38° under toluene with stated amts. of glucose. The mixts. were buffered with phosphates. Glycogen detns. were made at intervals. The addition of glucose retarded the normal decrease in glycogen. No glycogen synthesis was observed under these conditions. The addition of Na oleate retarded glycogenolysis greatly.

F. S. HAMMETT

The effect of water ingestion on the amount of reducing substances in blood and urine. A. NORGAARD. *Biochem. Z.* 130, 304-11(1922).—When H<sub>2</sub>O diuresis is produced in fasting man in certain cases there occurs a slight decrease in the reducing power of the blood. During the diuresis the reducing power of the urine falls way below that of the blood. The absolute amt. of excreted reducing substances is const. during a stated period and not influenced by diuresis. There is a certain relationship between the amt. of reducing substances excreted and their simultaneous concn. in the blood in that they vary in the same direction. The reducing substances were detd. by titration with Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub>.

F. S. HAMMETT

Action of normal and asphyxiated serum on the isolated intestine. R. PELLEGRINI. *J. physiol. path. gén.* 20, 14-25(1922); cf. *C. A.* 16, 951.—A detailed description of finely executed expts. Asphyxia often increased the substances in the serum which excite tonus and rhythmical movements of the intestinal strip, but the material is presumably not adrenaline.

F. S. HAMMETT

The reaction of the oxidases of human leucocytes. N. FIESSINGER AND P. MATHIEU. *J. physiol. path. gén.* 20, 49-58(1922).—A simultaneous histological and chem. study of the leucocytes from human blood or pus. In certain circumstances during the course of severe illnesses and generally in the hrs. preceding death there tends to be an increase in the oxidase power of the leucocytes. The leucocytic granule is probably a protein-lipoid (and probably also metal) complex which elaborates at its periphery an enzyme. This enzyme is probably absorbed in the lipid periphery and gives rise to the micro-chemical reaction of the oxidases.

F. S. HAMMETT

Experimental studies on heat stroke and insulation. Chemotherapy: heat hemolysis habitude or immunity. C. RICHER, JR. *J. physiol. path. gén.* 20, 59-71(1922).—Rabbits and rats were exposed in glass vessels to the sun or in a dry air oven. Young or adolescent animals were more resistant to heat than adults. Fasting and bleeding rendered the animals more susceptible. Camphorated oil and caffeine had a beneficial value, adrenaline none. Habitue is possible. The heat stroke is a colloid-clasis.

F. S. HAMMETT

Studies of renal innervation by a comparison of the urinary output of normal animals and those in which the kidneys have been denervated. Y. HARA. *Z. Biol.* 75, 177-203(1922).—After describing a new method for division of the dog bladder without harmful effects thereto, from which the urine from each kidney can be collected, H. reports the analyses of the urines from normal and denervated kidneys in the same animal. These urines differ consistently and constantly in acidity, d., urea and Cl, these elements always being less in that from the denervated kidney. The differences were more accentuated by a meat diet than by a diet of milk. The absolute amt. of the above substances excreted was greater on the operated than on the normal side. Injected dyestuffs were excreted earlier by the normal kidney. These facts are explicable on the basis that there are secretory nerves for the kidney which regulate the permeability of the kidney cells. An explanation based simply on alterations in circulation is not easily tenable.

F. S. HAMMETT

The salt content of the urine of marine fish. W. SULZE. *Z. Biol.* 75, 221-38(1922).—The detn. of the salt content of the urine of fish showed that the Mg, Ca, Cl and SO<sub>4</sub> ions dominate all the other inorg. salts. In some cases practically no other inorg. ions were present. A comparison of the Ca:Mg relations in urine and sea water



showed that the quotient Mg absolute:Ca absolute is practically the same for urine as is the quotient Mg equivalent:Ca equivalent for sea water, i. e., 4.7. The *Conger vulgaris* is an exception. The urine of marine Teleosts originates from the sea water and the relative amt. of Mg and Ca in the urine is an expression of the relative velocity with which these ions penetrate the body.

F. S. HAMMETT

Relation of salivary to gastric secretion. TOMOICHI NAKAGAWA. *Biochem. J.* 16, 390-393(1922).—Pure gastric juice was collected by "sham feeding" from a dog which had a gastric fistula and an esophagostomy. Mett's method was used throughout. Maxwell's expts. (*C. A.* 10, 493) on the inhibitory effect of colloidal starch on peptic digestion were confirmed. Though the action of pepsin is inhibited, that of rennin is accelerated.

BENJAMIN HARROW

Phosphate excretion in the urine during water diuresis and purine diuresis. JOHANNES BOCK AND POUL IVERSEN. *Kgl. Danske Videnskab. Selskab. Biol. Medd.* 3, no. 1, 1-28(1921).—Rabbits of approx. 3 kg. body wt. were used as exptl. animals. In each expt. the urine was collected by catheter, and the bladder washed with distd.  $H_2O$  every 30 min.; the vol. of each sample of urine and its  $P_2O_5$  content were detd. After several normal samples of urine had been obtained, the rabbit was given 200 cc. of water by means of a stomach tube in order to produce water diuresis. From 2 to 4.5 hrs. later, theophylline was administered by means of the stomach tube in doses ranging from 0.15 g. to 0.25 g. in order to produce purine diuresis. At intervals (usually hourly) throughout the expt., blood was drawn, and the  $P_2O_5$  content of its plasma detd. In water diuresis no connection existed between the amt. of  $P_2O_5$  excreted and the vol. of the urine; a profuse water diuresis did not regularly produce an augmented excretion of  $P_2O_5$  in the urine. Theophylline usually produced a profuse diuresis and an increase in the  $P_2O_5$  content of the urine; the diuresis usually had a short duration, but, during the period of max. excretion was more profuse than water diuresis. The increased excretion of  $P_2O_5$  by no means followed the course of the diuresis; these 2 phenomena therefore were not connected, but were due to different processes entirely independent of each other. The  $P_2O_5$  content of the plasma either remained practically unchanged or became reduced, at times markedly, after administration of theophylline. The augmented excretion of  $P_2O_5$  in the urine, produced by this purine, was not dependent on either an increased concn. of  $P_2O_5$  in the plasma or the vol. of the urine, but must be attributed to a specific action of the drug on secretory elements of the kidney, probably not the same elements as those producing the diuresis. The conclusion is drawn that the urine is not merely a product of the filtration of a deproteinized plasma through the glomerulus and an absorption of a fluid of const. compn. through the tubule cells. Stress is placed upon stimulating effects exerted by specific compds. on secretory elements in the kidney.

JOSEPH S. HEPBURN

Influence of thromboplastic substances on the coagulation of the blood. A. SZENES. *Mitt. Grenz. Med. Chir.* 32, 627-52(1920); *Physiol. Abstracts* 6, 129(1921).—Intravenous injection of small doses (5 cc.) of hypertonic (10%) NaCl soln. produced an initial inhibition of coagulation, followed at times by an acceleration. When this treatment was combined with the subcutaneous injection of press-fluid of organs, the coagulation time was further decreased. Intramuscular injection of Ca gelatin almost always caused an initial inhibition, followed by an acceleration of coagulation. Intravenous administration of Ca salts usually produced an acceleration of coagulation; the effect, as a rule, was apparent within a few min., and lasted for hrs. and even days; in minute doses they caused an initial inhibition of coagulation.

J. S. HEPBURN

Physiological researches on the neuromuscular development in man and the animals. GEORGES BANU. *Monograph* 1922, 110 pages, Paris, Imprimerie de la cour d'appel.—The following biochem. interpretation of muscular development is

offered. Biochem. and physicochem. characteristics govern the activity and the histological structure of muscle; among these governing factors are inorg. compds., lipins, mitochondria, oxidases, and the permeability of membranes. Inorg. elements apparently play an important role since they undergo changes from birth to adult life; thus Ca is present in small amts. during fetal life and at birth, but becomes more abundant as the physiol. phenomenon known as chronaxia decreases in magnitude. Ca increases the excitability of the nerves. Quant. and qual. variations in the other inorg. elements, especially the alkaline and alkaline earth metals, may act either directly or indirectly by modifying the permeability of membranes; in this connection, attention must be paid to the equilibria and the antagonism of ions. It is difficult to interpret neuromuscular development by the study of inorg. constituents. The lipins (fats, lecithin, cholesterol) have an important role in this development. They increase in amt. after birth, and modify physiol. activity by changing the permeability, imbibition, excitability, and chronaxia of the tissues. Increased imbibition produces decreased chronaxia. Imbibition increases, as the ratio of cholesterol to fatty acids or of cholesterol to phosphorized lipins grows greater. High values for chronaxia, such as are found in the new born, occur also in older infants in certain pathological states such as rickets. The muscles of the new born resemble unstriated muscle histologically and physiologically.

JOSEPH S. HEPBURN

Reaction for blood with hydrogen peroxide in statu nascendi. A. PATZAUER. *Chem.-Ztg.* 45, 1056(1921).—A small quantity of  $MgO_2$  is dissolved in very dil. AcOH and, when violent evolution of gas ceases, guaiacum tincture or benzidine dissolved in AcOH is added, followed by the ethereal ext. of the blood.

J. C. S.

Relation between viscosity and the ratio of cholesterol in serum to that in whole blood. ROUZAUD AND THIÉRY. *Compt. rend. soc. biol.* 85, 964-5(1921).—The ratio of cholesterol in the serum to that in whole blood varies directly with the viscosity. There is a larger fraction of cholesterol in the serum when the blood is rich, than when it is poor, in red cells. This is considered to be of importance in cases of hypercholesterinemia.

J. C. S.

Protein intoxication. F. PENTIMALLI. I. Introduction. *Riforma med.* 37, 532-6(1921). II. Toxicity of egg albumin and its derivatives. *Gazz. intern. med. chir. igiene* 29, 65-72(1921). III. Toxicity of peptones. *Rass. intern. clin. terap.* 2, 185-92(1921). IV. Toxicity of milk and its derivatives. *La pediatria* 29, 481-94(1921). V. Behavior of blood pressure and of respiration. *Folia med.* 7, 321-30(1921). VI. Behavior of body temperature. *Arch. sci. biol.* 2, 44-58(1921). VII. Nystagmus. *Riforma med.* 27, 573-8(1921). VIII. Morphological changes of the blood. *Hematologica* 2, 527-78(1921).—The physiol. action of injections of proteins and protein products was studied under the various headings indicated in the titles.

J. C. S.

Physiology of the liver. II. The liver as a regulator of the glucose concentration of the blood. F. C. MANN AND T. B. MAGATH. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 285-6(1921); cf. *C. A.* 15, 1155.—Following total removal of the liver in dogs there is a fall in blood sugar. When blood sugar is reduced to 0.05 or 0.04% the animal becomes comatose and death occurs when blood sugar is at about 0.03 or 0.04%. Moribund animals may be made to recover by the injection of dextrose. III. The nitrogen constituents of the blood following removal of the liver. F. C. MANN AND T. B. MAGATH. *Ibid* 55, 286-7.—After removal of the liver in dogs there is an increase in blood non-protein N, amino acid N, uric acid N and a fall in urea N; creatinine N is not changed. In geese there is a rapid rise in blood urea N following liver removal.

J. F. LYMAN

Specific dynamic action of thyroxin. H. S. PLUMMER AND W. M. BOOTHBY. *Proc.*

*Am. Physiol. Soc., Am. J. Physiol.* 55, 295-6(1921).—It is estd. that between 0.2 and 0.4 mg. of thyroxin are destroyed daily in a myxedematous subject brought up to normal basal metabolic rate by injection of thyroxin. From 12 to 14 mg. of active thyroxin must be present in the body to maintain the basal metabolic rate at the normal level. The daily dosage by mouth necessary to maintain normal metabolism in a myxedematous person is about 1.6 mg. Thyroxin has a sp. dynamic action increasing the metabolism in proportion to the amt. actively present in the body. Thyroxin probably acts by rendering more readily available nascent O atoms. J. F. LYMAN

An explanation for the increased oxidation following the ingestion of fats, fatty acids and alcohols. W. E. BURGE AND J. LEICHSENING. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 299-301(1921).—The increase in oxidation after the ingestion of fats, fatty acids and alcs. is attributed to the increase in catalase brought about by the stimulation of the alimentary glands, particularly the liver, to an increased output of this enzyme. J. F. LYMAN

An explanation for the increased oxidation after fertilization during youth, and for its decrease in old age. W. E. BURGE AND J. LEICHSENING. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 302-4(1921).—The variations in the intensity of oxidation in the life cycle are attributed to the variations in the amts. of catalase present. J. F. L.

The heat liberated by the beating heart. III. The oscillations of temperature during the cardiac cycle, or the thermocardiogram of the terrapin. C. D. SNYDER. *Am. J. Physiol.* 59, 254-89(1922).—In the terrapin heart, beating at sufficiently slow rates, there appear oscillations of temp. that are characteristic for the various mechanical phases of the cardiac cycle. These oscillations fall into 6 distinct phases. The series for a single heart beat as traced in the graphic record is termed a thermocardiogram. The analysis of the thermocardiogram shows that the whole history of events covering hours and days of fatigue and recovery in the skeletal muscle is repeated in the short span of a single heart beat. J. F. LYMAN

Reasons for believing that respiratory X is not  $\text{C}_2\text{H}_4$ . Y. HENDERSON. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 441-2(1922).—Respiratory X is the hypothetical substance occurring in the blood under low  $\text{O}_2$ . It is not acid. It appears to act not upon the respiratory center but upon the pulmonary vagus endings. Its action is similar to that of  $\text{H}_2\text{S}$ , although apparently it cannot be simply  $\text{H}_2\text{S}$ . J. F. LYMAN

Integumentary changes in the sheep following thyroidectomy and administration of thyroxin. S. SIMPSON. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 445-6(1922).—A Rambouillet ram thyroidectomized at 5 months of age showed much less horn growth at 18 months of age than normal. A thyroidectomized lamb treated with 0.5 mg. thyroxin daily for about 14 days shed its wool completely. When thyroxin was reduced a normal fleece developed. J. F. LYMAN

Blood flow and oxygen metabolism of the thyroid gland. F. P. KNOWLTON, M. S. DOOLEY AND A. N. CURTISS. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 446-7(1922).—In the resting dog's thyroid the blood flow was 3.55 cc. per g. per min. and the  $\text{O}_2$  consumption 0.0927 cc. per g. per min. J. F. LYMAN

The oxygen capacity of birds' blood. T. K. KRUSE. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 449(1922).—The av.  $\text{O}_2$  capacity of the blood is 15% (3 cc. per 100 cc. of blood) higher in the duck than in the chicken. J. F. LYMAN

Blood volume changes following water abstinence. N. M. KEITH. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 452-3(1922).—In dogs not taking food and water for long periods there is a marked shrinkage of the circulating blood and plasma. There appear to be 2 distinct reactions in the blood serum: (1) an actual concn., (2) some equalizing factor in the tissues which prevents definite protein concn. J. F. LYMAN

Thermal effects accompanying alteration of the oxygen and carbon dioxide content

of blood. H. W. HAGGARD. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 454(1922).—The reaction of whole reduced blood with  $O_2$  or  $CO_2$  is practically athermic. The combination of laked blood or hemoglobin solns. with ether gas is exothermic, the amt. of heat actually liberated depending on the state of aggregation of the hemoglobin.

J. F. LYMAN

Variations in the ash of sweat. G. A. TALBERT. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 454(1922).—The ash of work sweat is higher than that of heat sweat. Sweat from the chest contains the higher ash, that from the arm less and that from the leg least. The parts that yield the higher acidity yield the smaller ash.

J. F. L.

The specificity of gastrin and pancreatic secretion. A. B. LUCKHARDT, S. C. HENN AND W. L. PALMER. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 457-8(1922).—Gastrin can be prepd. from the stomach mucosa or from the duodenum. Secretin likewise can be prepd. from both sources. When HCl is placed in the intestine the pancreas only is stimulated to secretion. It is, therefore, concluded that the secretin absorbed from the gut under the influence of HCl placed therein is a different substance from that present in HCl exts. made from gastric or intestinal mucosa.

J. F. L.

The excretion of chloride, urea, and water by human kidneys. E. F. ADOLPH. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 460-1(1922).—A dose of the substance whose excretory concn. was to be studied was ingested in the morning, and the urine collected at approx. hourly periods. The detns. made were vol., sp. gr., solids, Cl, urea,  $NaHCO_3$ , and  $\Delta$ . There is a distinct limit of the total osmotic work which the kidneys can perform, and this is the true max. concn. rather than the concn. of any single constituent.

J. F. LYMAN

The effect of X-rays upon glandular activity. I. The submaxillary gland. A. C. IVY, B. H. ORNDORFF AND A. JACOBY. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 469-70(1922).—The acute and chronic effects of X-rays upon the submaxillary gland have been studied in dogs. Strong dosage for 10 mins. produced a decrease of 40% in the secretion excited by chewing meat and by pilocarpine injection, the response to acid placed in the mouth not being altered in amt. Chem. analyses showed a marked reduction in the total solids of the secretion and a marked decrease in viscosity, the inorganic solids being more reduced than the organic.

J. F. LYMAN

The composition of glomerular urine. J. T. WEARN. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 490(1922).—Frog glomerular urine was collected by means of a capillary pipet from the capsule of Bowman. Comparison of the compn. of such urine with that from the bladder indicates that reabsorption occurs in the tubules and that filtration is the process involved in the glomerulus.

J. F. LYMAN

The production of carbon dioxide by the smooth muscle of sea anemones. G. H. PARKER. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 466(1922).—The common sea anemone *metridium* gives off no more  $CO_2$  while in a contracted state than in the relaxed condition. During the process of contraction  $CO_2$  production is increased about 25%.

J. F. LYMAN

Fibrinogen following removal of the liver. C. S. WILLIAMSON, F. J. HECK AND F. C. MANN. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 487(1922).—After complete removal of the liver there appears to be some regeneration of fibrinogen. The liver is not essential therefore for the immediate process of regeneration.

J. F. LYMAN

Alkaligenesis in tissues. I. Ammonia production in the nerve fiber during excitation. S. TASHIRO. *Am. J. Physiol.* 60, 519-43(1922).—By new methods it is shown that the excited nerve produces both acid and alk. substances, i. e.,  $CO_2$  and  $NH_3$ . The source of this  $NH_3$  is not bacterial decompn. nor urea; it is probably formed directly from protein.

J. F. LYMAN

Acid production in shed blood. C. L. EVANS. *J. Physiol.* 56, 148-56(1922).—

The fall in  $\text{CO}_2$  capacity of shed blood is due to a conversion of dextrose into lactic acid as a result of glucolysis. The change is greatly accelerated though not actually produced by a lowering of the  $\text{CO}_2$  pressure of the blood. It can be retarded by adding 0.05 to 0.1% NaF to the blood. The change seems to take place in the white blood cells mainly.

J. F. LYMAN

The hydrogen-ion concentration and some related properties of normal human blood. J. BARCROFT, A. V. BOCK, A. V. HILL, T. R. PARSONS, W. PARSONS AND R. SHOJI. *J. Physiol.* **56**, 157-75(1922).—The following relations at  $37^\circ$  were found based on expts. with 10 normal men. (1) The relation between  $C_H$  of the blood plasma and the  $\text{CO}_2$  pressure is represented by a slightly curved line. (2) The relation between  $\text{CO}_2$  pressure ( $p_{\text{CO}_2}$ ) and vol. % of total  $\text{CO}_2$  absorbed ( $v_{\text{CO}_2}$ ) is represented by the equation  $C_H = 4.7 p_{\text{CO}_2} / v_{\text{CO}_2}$ . (3) The relation between the vol. % of  $\text{CO}_2$  absorbed and  $C_H$  is represented by the equation  $\text{vol. CO}_2 = b(10^8 C_H) + c$  ( $b = 8.4 \pm 2$  and  $c = 16.6 \pm 10$ ). (4) The relation between  $1/K$  and  $C_H$  is a direct proportion,  $1/K = \alpha(10^8 C_H)$ , where  $K =$  the  $\text{O}_2$  dissociation const.  $\alpha$  has an av. value of 360 with variations between 316 and 436 in 9 individuals. This variation in  $\alpha$  is thought to be due to differences in  $C_H$  inside the corpuscle and in the plasma.  $C_H$  measurements are always made on the plasma, not on the contents of the corpuscle. The theory for this difference based on the Donnan membrane equil. is discussed. **Appendix I. The effect on the form of the dissociation curve of the change in hydrogen-ion concentration produced by oxygenation of blood.** A. V. HILL. *Ibid* 176-7.—Oxygenation of completely reduced blood causes a rise in its  $C_H$  of about 12%. The effect of this oxygenation is to stretch slightly the dissociation curve in the direction of the  $x$  axis. **Appendix II. The mechanism of the volume  $\text{CO}_2$ - $C_H$  relation.** A. V. HILL. *Ibid* 178.—The addition of  $\text{NaHCO}_3$  to blood increases  $b$  without altering  $c$  in the equation:  $v_{\text{CO}_2} = b(10^8 C_H) + c$ ; hence variations in  $c$  in different individuals may be attributed to variations in the amt. of bicarbonate present in the blood.

J. F. LYMAN

Formation and distribution of phosphates in muscle. L. B. WINTER AND W. SMITH. *J. Physiol.* **56**, 227-31(1922).—By a new microchem. test for phosphates (treatment of the tissue with slightly acid ammonium molybdate soln. and then with  $\text{K}_4\text{Fe}(\text{CN})_6$  soln. gives a blue ppt. with free phosphate) it was shown that the amt. of uncombined or free phosphate in striated muscle is increased in rigor. An increase was not found in non-striated muscle. It is suggested that  $\text{H}_2\text{PO}_4$  plays some important part in the production of quick muscular contraction.

J. F. LYMAN

The metabolism of the salivary glands. II. The blood sugar metabolism of the submaxillary gland. G. V. ANREP AND R. K. CANNAN. *J. Physiol.* **56**, 248-58 (1922); cf. *C. A.* **15**, 2495.—In the resting submaxillary gland of the dog the consumption of dextrose per g. of gland per hr. varied between 0.8 and 2.9 mg. (av. = 2.1). Atropine does not change the rate of sugar consumption; pilocarpine increases it. The increase in dextrose consumption per 1 cc. of saliva secreted varied in 8 expts. between 0.7 and 2.7 mg. with an av. of 1.5 mg.

J. F. LYMAN

The excretion of phosphoric acid in urine. H. C. BROADHURST AND J. B. LEATHES. *Proc. Physiol. Soc., J. Physiol.* **54**, xxviii(1921).—Phosphate elimination by the kidneys is most rapid in the evening and slowest in the morning. This variation is largely independent of diuresis, the reaction of the urine and the ingestion of food. J. F. L.

The brown granules found in some endocrine glands. R. K. S. LIM. *Proc. Physiol. Soc., J. Physiol.* **54**, xxix(1921).—In unstained formol-fixed preps. of various endocrine glands brown granules occur. They are stained a deep green with methylene blue, but other dyes have no characteristic effect.

J. F. LYMAN

The liberation of carbon dioxide from carbonate by blood and serum. E. F. ADORPH. *Proc. Physiol. Soc., J. Physiol.* **54**, xxxiv(1921).—When  $\text{CO}_2$ -free air is

bubbled through blood at 40° all the  $\text{CO}_2$  is removed from the blood at the end of 30 mins. If  $\text{Na}_2\text{CO}_3$  be added to such  $\text{CO}_2$ -free blood and the aeration continued, more  $\text{CO}_2$  will be evolved. The decompn. of  $\text{Na}_2\text{CO}_3$  by serum could not be demonstrated.

J. F. LYMAN

**Arterial carbon dioxide tensions.** J. M. H. CAMPBELL and E. P. FOULTON. *Proc. Physiol. Soc., J. Physiol.* **54**, xlix(1921).—The  $\text{CO}_2$  pressure of the arterial blood and  $\text{CO}_2$  pressure of the alveolar air were detd. in 13 pathol. cases. In cases with breathlessness the alveolar  $\text{CO}_2$  pressure was always less than the arterial  $\text{CO}_2$  pressure.

J. F. LYMAN

**Physiological cost of walking—in and out of training.** A. D. WALLER and G. DE DECKER. *Proc. Physiol. Soc., J. Physiol.* **54**, lxxxi(1921).—At approx. equal speeds the difference in cost of walking of a man out of training and in training is great, viz., 0.215 cc.  $\text{CO}_2$  per horizontal kg. and 0.098 cc., respectively.

J. F. LYMAN

**The physiological cost of collier's work.** A. D. WALLER and G. DE DECKER. *Proc. Physiol. Soc., J. Physiol.* **54**, lxii(1921).—The mech. efficiency of the men seemed to decrease, e. g., the physiol. cost of moving 1 kg. 1 m. horizontally more than doubled after 7 hrs. work.

J. F. LYMAN

**Le Chatelier's theorem in relation to reduction of oxyhemoglobin, neutrality regulation and oxidation in the body.** H. E. ROAF. *Proc. Physiol. Soc., J. Physiol.* **54**, lxiv(1921).—The theorem is applied to various physiol. processes of the body with agreement between expectation and fact.

J. F. LYMAN

**The influence of coagulation upon the reaction of blood.** J. P. ROSS. *Proc. Physiol. Soc., J. Physiol.* **54**, lxxx(1921).—The reaction of blood is not affected by coagulation.

J. F. LYMAN

**The chlorine-ion concentration of plasma of oxidized and reduced blood.** W. E. L. BROWN and A. V. HILL. *Proc. Physiol. Soc., J. Physiol.* **54**, cxxi(1921).—By an electrometric method, it was not possible clearly to show any difference in the  $\text{Cl}$ -ion concn. between oxidized and reduced blood.

J. F. LYMAN

**Class exercises on blood reaction.** C. L. EVANS. *Proc. Physiol. Soc., J. Physiol.* **54**, cxxxv(1921).—(1) *Reactions of aqueous  $\text{CO}_2$*  (without buffers).  $\text{H}_2\text{O}$  free from  $\text{CO}_2$  has a  $p_{\text{H}}$  of about 7.0.  $\text{H}_2\text{O}$  satd. with out-door air has a  $p_{\text{H}}$  of about 5.5. Satd. with alveolar air the  $p_{\text{H}}$  is about 4. (2) *Reaction of  $\text{NaHCO}_3$  -  $\text{CO}_2$  solns.* (a) Doubling the  $\text{NaHCO}_3$  concn. results in halving of the  $\text{C}_{\text{H}}$ , i. e., a rise of 0.3 in  $p_{\text{H}}$ . Prep. solns. of 0.01, 0.02 and 0.04  $M$   $\text{NaHCO}_3$  and sat. 5 cc. of each soln. with alveolar air in a separatory funnel at room temp. Transfer to the comparator vessel and cover with paraffin. (b) Proportionate increase or diminution in the concn. of both  $\text{CO}_2$  and  $\text{NaHCO}_3$  leaves the  $p_{\text{H}}$  unchanged, e. g., 0.01  $M$   $\text{NaHCO}_3$  + 3%  $\text{CO}_2$ , 0.02  $M$   $\text{NaHCO}_3$  + 6%  $\text{CO}_2$  and 0.04  $M$   $\text{NaHCO}_3$  + 12%  $\text{CO}_2$  have the same  $p_{\text{H}}$ . (3) *Reaction of blood at alveolar  $\text{CO}_2$  tensions.* Place 4 or 5 cc. of fresh oxalated blood in a separatory funnel filled with alveolar air and kept at 37°; rotate the funnel horizontally for 5 mins. Transfer to a dialyzer and carry out dialysis and det.  $p_{\text{H}}$  of diffusate. (4) *Relation of blood reaction to alk. reserve of plasma.* Divide 15 cc. of oxalated blood into 3 equal parts. To 1 add 1 cc. 0.85%  $\text{NaCl}$ , to 2 add 1 cc. 0.2  $M$   $\text{NaHCO}_3$ , to 3 add 1 cc. 0.05  $N$   $\text{HCl}$ . Sat. each sample with alveolar air (at room temp.) dialyze and det.  $p_{\text{H}}$ . (5) *Effect of temp.* Det. the  $p_{\text{H}}$  of blood satd. with alveolar air at room temp. and at 37°. The  $p_{\text{H}}$  of blood is detd. by the method of Dale and Evans (*C. A.* **15**, 2462).

J. F. L.

**Acidity of muscle during maintained contraction.** H. E. ROAF. *Proc. Physiol. Soc., J. Physiol.* **56**, i(1922).—In contraction with normal frog muscle the acidity disappears after the contraction but repeated stimuli seem to produce a greater and more continued acidity thus accounting for the greater tension in a tetanus.

J. F. LYMAN

**The microscopic appearance of human red blood corpuscles in hypertonic saline.**

W. W. WALLER. *Proc. Physiol. Soc., J. Physiol.* **56**, xiii(1922).—The apparent change of red corpuscles in 8% NaCl soln. is less than in 1.3% NaCl. The "crenation" effect in 1.3% NaCl is due to alkali dissolved off the glass of the microscopic slide. J. F. L.

The recovery oxygen-usage after exercise in man. H. LUPTON. *Proc. Physiol. Soc., J. Physiol.* **56**, xvii(1922).—After severe exercise the primary oxidative recovery is rapid and is followed by a prolonged secondary recovery extending to 30 mins. after the end of exercise. Though part of this will be caused by the general rise in body temperature, it is probably chiefly due to a restoration of the glycogen reserves at the expense of fat. J. F. LYMAN

The recovery heat production in isolated muscles. W. HARTREE AND A. V. HILL. *Proc. Physiol. Soc., J. Physiol.* **56**, xxiii(1922).—The total heat liberated in the complete cycle of production and oxidative removal of 1 g. of lactic acid is 620 cal. This is only about 16% of the total heat of oxidation. Lactic acid is, therefore, not oxidized in recovery, but rather, restored to its precursor glycogen. J. F. LYMAN

The reaction of blood. R. E. CONWAY AND F. V. STEPHEN. *Proc. Physiol. Soc., J. Physiol.* **56**, xxv(1922).—Detns. show that laked blood is more acid than whole blood by about 0.09  $p_H$ , and laked corpuscles more acid than whole blood by about 0.13  $p_H$ . The inside of the corpuscle therefore is about 35% more acid than the outside. J. F. L.

The adrenaline content of the suprarenal capsule. A. RICHAUD. *Compt. rend. soc. biol.* **86**, 26-8(1922).—The adrenaline content of different samples of dried suprarenal glands estd. physiologically is greater than that estd. chemically. S. MORGULIS

The distribution of hemoglobin upon the surfaces of the erythrocytes. K. BÖRGER. *Sitzb. preuss. Akad. Wiss.* **1922**, 140-2.—By detg. the number of red blood cells (RBC) per  $mm^3$ , and the hemoglobin (Hb) content per 100 cc. of blood of 8 mammals, including man, B. found that the av. Hb content of a single RBC varies from one species to another but is const. for a given species. The figures in  $10^{-12}$  g. Hb per single RBC are: man 30, dog 24, pig 22, rabbit 20, ox 19, horse 18, sheep 11, goat 8. By measuring the av. diameter of the RBC of these mammals the author was able to calc. the av. surface area of a single RBC and also to show that for all the mammals studied the ratio Hb content of one RBC / surface area of one RBC = const. These const. are (av. Hb content per  $\mu^2$  surface in  $10^{-14}$  g.): man 31, dog 29, pig 32, rabbit 29, ox 34, horse 33, sheep 33, goat 32. It follows that the Hb content of a single mammalian RBC varies as the sq. of its diam., and that the Hb content of any mammalian RBC may be calcd. if only its diameter is known. The importance of these results in the *physiology and pathology of the respiratory functions* is commented upon. W. A. PERLZWEIG

Condition of electrolytes in the blood. B. S. NEUBAUSSEN. *Nature* **110**, 8-9 (1922).—Exptl. results are quoted to show that the NaCl present in the blood is ionized to an equal extent as a similar concn. of the same salt in aq. soln. W. H. ROSS

Studies on salivary secretion. I. Secretion of the parotid in the horse. A. SCHEUNERT AND A. TRAUTMANN. *Arch. ges. Physiol. (Pflüger's)* **192**, 1-32(1921).—In the horse secretion from the parotid gland is largely due to mechanical stimulation; psychic, chem. and reflex stimuli play but little part. The activity of the gland is detd. in part by the side upon which the food is chewed, and the fluid secreted on this side differs in chem. compn. from that of the other side, having a higher content in ash and Cl and a lower percentage of N. The nature of the food does not modify the compn. The secretion contains no diastase. The anatomy and pathol. of the gland are discussed. II. Secretion of the parotid and mandibular glands in sheep. *Ibid* 33-69.—Secretion from the sheep parotid is continuous and is only slightly increased during feeding. The secretion has an alkalinity equal to a 0.56 to 0.77% soda soln., a relatively high content in dry substance (1.1 to 1.25%), and from 0.75 to 0.9% of ash. Psychic stimuli increase the flow somewhat. Flow of secretion from the mandibular gland occurs for the most

part only during feeding. It is neutral or but weakly alk. in reaction, is mucous-like in character, contains 0.4–1% of dry substance, and but 0.05–0.2% of ash. Its compn. is influenced by the type of food. No diastatic enzyme is present. The anatomy and the pathol. changes associated with the production of fistulas are described. **III. Critical discussion.** *Ibid* 70–80.

G. H. S.

**Physiology of the liver.** **IV. Glycogen and protein feeding.** P. JUNKERSDORF. *Arch. ges. Physiol.* (Pflüger's) 192, 305–17(1921).—Expts. on dogs made after periods of hunger followed by glycogen and beef or cod-fish feeding indicate that the liver not only converts protein into glycogen but also that under certain conditions, as preliminary glycogen feeding, the administration of "unphysiol." protein results in a significant decrease in the glycogen content of the liver and of the musculature. The increase in fat content of the liver occurring coincidentally with these other changes suggests that the carbohydrates of the liver may be converted into fat. The exclusive ingestion of such "unphysiol." protein thus reacts upon the liver to alter the structure and to pervert the function of the liver cells.

G. H. S.

**Thyroid feeding of invertebrates.** R. H. KAHN. *Arch. ges. Physiol.* (Pflüger's) 192, 81–92(1921).—No change in the development of larvae of *Corethra plumicornis*, *Ecdyurus forcipula*, or *Tenebrio molitor* resulted from thyroid feeding.

G. H. S.

**Muscle tonus.** **I. The path of the tonic innervation from the central nervous system to the muscle.** E. A. SPIEGEL. *Arch. ges. Physiol.* (Pflüger's) 193, 7–15 (1922).—Expts. on frogs indicate that the regulation of tonus in skeletal muscle is cared for by the same fibers as those functioning in contraction, namely, the axones of the anterior horn cells.

G. H. S.

**Mechanism of gastric digestion in the omnivora.** ARTHUR SCHEUNERT AND FRITZ KIOK. *Arch. ges. Physiol.* (Pflüger's) 193, 16–28(1922).—Examin. of the pig stomach shows that the ingested food is not thoroughly mixed immediately after it enters the stomach but that it remains in layers for a considerable time—15 to 16 hrs. Admixt. of the ingested food takes place first in the pyloric portion, extending later, when digestion is more nearly complete, to the other portions of the stomach.

G. H. S.

**Gaseous metabolism in curarized frogs.** **I. Carbon dioxide.** HANS ROSENCRANTZ. *Arch. ges. Physiol.* (Pflüger's) 193, 39–46(1922).—Normal, curarized, and curarized and exsanguinated frogs showed a  $\text{CO}_2$  production as follows: the normal frog minimum 22.02, max. 59.44, av. 41.75 cc. per kg. of frog per hr.; the curarized frog, with the above values approx. halved, gave an av. value of 22.52 cc.; the exsanguinated-curarized frog gave values about  $\frac{1}{3}$  those of the normal and approx.  $\frac{1}{3}$  those of the curarized (av. 13.24). In the curarized frog the  $\text{CO}_2$  production varies with the time, relatively high at first and reaching a const. level after 5 hrs.

G. H. S.

**Organ extracts with specific action.** **VI. EMIL ABDERHALDEN AND ERNST GELLHORN.** *Arch. ges. Physiol.* (Pflüger's) 193, 47–83(1922); cf. *C. A.* 15, 2667.—Testis optone prep. by hydrolysis with 10%  $\text{H}_2\text{SO}_4$  stimulates the isolated heart but when the same tissue is subjected to proteolytic enzymes it is inert until it has been subjected to further treatment with  $\text{H}_2\text{SO}_4$ . The activity of testicular optones is further intensified by the removal of the alc.-sol. substances. Placenta optone, prep. by fermentative decompn., stimulates contraction, while the acid product merely causes a negative inotropism. Thyroid and goiter optones stimulate the surviving frog esophagus, while in the same concn. placenta optones (both the ferment and the acid preps.) induce paralysis. Only in more dil. concns. does the acid optone of placental tissue cause a stimulation. The testicular optone, extd. by alc., also stimulates the esophagus. Optones from thyroid, hypophysis, thymus, ovary, placenta (ferment) and testis (acid) dilate the capillaries of the frog web, preventing or diminishing the effect of adrenaline. **VII. Chemotactic activity of optones for paramecia.** EMIL ABDERHALDEN AND OLGA



SCHIFFMANN. *Ibid* 194, 206-17(1922).—Optones from corpus luteum, hypophysis, ovary, thyroid, and thymus in dilns. of 1:100 were negatively chemotactic or killed paramacia. In higher dilns. they exerted a positive chemotactic effect but no sp. action of individual optones could be detected. Thymus, testis, and thyroid optones increased the division rate of paramacia; hypophysis and corpus luteum optones were inhibitory, although with that of the hypophysis a tolerance can be developed which removes the inhibition.

G. H. S.

Iron of the urine and kidney function. RUDOLF EHRENBURG AND ALFRED KARSTEN. *Arch. ges. Physiol.* (Pflüger's) 193, 86-92(1922).—The amt. of Fe excreted in the urine is a measure of kidney function, and the elimination corresponds to the concg. power of the kidney, increasing with the added activity of the kidney in excretion. G. H. S.

Humoral transmissibility of heart-nerve action. II. O. LOEWI. *Arch. ges. Physiol.* (Pflüger's) 193, 201-13(1922); cf. *C. A.* 16, 1267.—The perfusion fluid collected from a frog heart during vagal stimulation is usually active upon a second heart. At times, however, particularly with toad hearts, irregular reactions are obtained. The inhibitory substance is not choline, nor is the accelerating substance to be found in the ash of the heart contents.

G. H. S.

Variations in the sedimentation rates of the erythrocytes of an animal, and of different animal species under various conditions. II. EMIL ABDERHALDEN. *Arch. ges. Physiol.* (Pflüger's) 193, 236-80(1922).—Red blood cells taken from different layers in a centrifugalized column of oxalated cells and resuspended in homologous plasma show quite different spontaneous sedimentation rates; those from the bottom of the column sediment most rapidly, those from the top layers least readily. This indicates that the cells of a given individual differ in some of their properties. The sediment velocity is also influenced by the plasma (compn. and source), by the relative concn. of cells, by the concn. of the salt soln. used in washing the cells, by the duration of the centrifugalization, and the time when tested after the withdrawal of the blood. The sedimentation rates also vary with the type of heterologous plasma in which they may be suspended.

G. H. S.

Effect of carbon dioxide on blood-sugar level. FRIEDRICH BINSWANGER. *Arch. ges. Physiol.* (Pflüger's) 193, 296-312(1922).—Rabbits and cats were forced to respire mixts. of O and CO<sub>2</sub> and detns. of blood sugar were made before and after such treatment, the change in sugar being correlated with the concn. of CO<sub>2</sub>. In concns. less than 14% CO<sub>2</sub> the blood sugar did not change, concns. of 14-20% increased it 0.02 to 0.04%, concns. above 20% caused an increase varying from 0.05 to 0.23%. The increase occurs very promptly, in some instances within 5 min., and the return to normal is also quickly accomplished.

G. H. S.

Influence of the hydrogen-ion concentration on the blood vessels with particular reference to the buffer of the perfusion fluid. EDGAR ATZLER AND GUNTHER LEHMANN. *Arch. ges. Physiol.* (Pflüger's) 193, 463-78(1922); cf. *C. A.* 16, 2544.—Perfusion expts. on frogs with fluids of varying  $p_H$  show that the degree of contraction of the vessels is detd., not only by the  $p_H$  of the fluid, but also to a large extent by the degree to which the fluid is buffered. A strongly buffered soln. is without effect within the  $p_H$  range 5.65 to 6.6; a weakly buffered soln. is inactive between  $p_H$  4.2 and  $p_H$  7.45; while with an unbuffered soln. the neutral region is from  $p_H$  2.9 to  $p_H$  9.35. From this it appears that the less a perfusion fluid is buffered the more readily it can be adjusted by the tissues to a reaction approximating that of the blood.

G. H. S.

Action of carbon dioxide baths on healthy men: The effects of high altitudes. G. LILJESTRAND AND R. MAGNUS. *Arch. ges. Physiol.* (Pflüger's) 193, 527-54(1922).—The high altitude did not affect the metabolism, the min. vol. of the heart, or the lung ventilation (unreduced). The alveolar and venous CO<sub>2</sub> tensions were slightly decreased.

Immersion in  $\text{CO}_2$  baths did not modify the basal metabolism but did cause (with the bath at  $23^\circ$ ) dilatation of the vessels of the skin and a loss in temp. of  $1^\circ$ . There was an accompanying increase in the min. vol. of the heart and in respiratory ventilation, with a decrease in the  $\text{CO}_2$  tension of the blood.

G. H. S.

**Comparative physiology of spermatozoa. II. Action of salts.** ERNST GELLHORN. *Arch. ges. Physiol.* (Pflüger's) 193, 555-75(1922).—The persistence of motility in frog and guinea pig spermatozoa was detd. in different salts. The effectiveness of the salts, anions and cations showed the following sequences: With spermatozoa of *Rana temporaria*  $\text{Li} \leq \text{Cs} > \text{Na} < < < \text{NH}_4 < \text{K} \geq \text{Rb}$ ; tartrate  $\leq \text{SO}_4 \geq$  phosphate  $\leq \text{CH}_3\text{COO}$

$< < \text{NO}_3 < \text{Br} < \text{Cl} < < \text{I} \geq$  citrate  $< < \text{F} < \text{SCN}$ . With spermatozoa of *Rana*

*esculenta*  $\text{Li} \geq \text{Cs} < \text{K} \leq \text{Rb} < < \text{Na} < \text{NH}_4$ ; phosphate  $< < \text{NO}_3, \text{CH}_3\text{COO} \leq$  tartrate,

$\text{SO}_4 < < \text{Br} < \text{Cl} < < \text{citrate} < \text{I} < < \text{F} < \text{SCN}$ . With guinea pig spermatozoa  $\text{K} \geq \text{Rb}$

$< \text{Na} < \text{NH}_4 < \text{Cs} < \text{Li}$ ; tartrate  $\leq \text{CH}_3\text{COO} \geq$  phosphate  $\leq \text{SO}_4 < < \text{Br} < \text{NO}_3 < \text{Cl}$

$< < \text{I} < \text{citrate} < \text{F}, \text{SCN}$ . **III. Action of salts and electrolyte mixtures.** *Ibid* 576-

94.—In mixts. the effect of one cation can be neutralized by that of another, thus, K, Sr, Mg, Ca, Ba, Fe, and Pb are antagonistic to NaCl. The toxicity of the halogens may be neutralized by phosphates, tartrate, sulfate, and acetate.

G. H. S.

**Effect on the permeability of frog muscle of the continued application of a non-stimulating current.** HERMANN WEISS. *Arch. ges. Physiol.* (Pflüger's) 194, 152-67 (1922).—The continued passage of an elec. current, which failed to elicit any visible response, through frog muscle caused an increased elimination of phosphoric acid, a diminished irritability of the entire muscle, particularly at the location of the poles, and a change in the tissue whereby K paralysis could be more readily induced.

G. H. S.

**Hormonal sterilization of female animals by the subcutaneous transplantation of ovaries of pregnant animals.** L. HABERLANDT. *Arch. ges. Physiol.* (Pflüger's) 194, 235-70(1922).—Expts. upon rabbits and guinea pigs showed that the subcutaneous transplantation of ovaries from a pregnant animal of the same species rendered the recipient incapable of conception in a relatively high percentage of cases.

G. H. S.

**Electrical conductivity of mammalian skin.** MARTIN GILDEMEISTER. *Arch. ges. Physiol.* (Pflüger's) 194, 323-5(1922).—Tests upon the skin of dogs, rabbits and guinea pigs show that the skin of mammals which is poor in glands possesses the same elec. properties as that of man, which is rich in glandular structures.

G. H. S.

**Permeability of human erythrocytes.** ERNST WEICHMANN. *Arch. ges. Physiol.* (Pflüger's) 194, 435-47(1922).—Human erythrocytes satd. with  $\text{CO}_2$  were suspended in solns. of cyanole, Lichtgrün FS, setopalin, and Ponceau 2R. Colorimetric detns., made after varying periods of time, indicated that the dyestuffs were not absorbed. Digifolin and strophanthin decreased the permeability of human red cells for Br ions, and also interfered with hypotonic hemolysis. In this latter respect digifolin was more active than strophanthin, but when either was added to the washing fluid used with the red cells the loss in resistance which usually accompanies this process was prevented.

G. H. S.

**Diaphragmatic tonus. III.** KEN KURÉ, TOHËI HIRAMATSU AND SHIGERU SAKAI. *Arch. ges. Physiol.* (Pflüger's) 194, 481-9(1922).—When the diaphragm is under a const.

pressure and the splanchnic nerve is sectioned a lowering of tonus is observed. Application of a 1% nicotine soln. to the celiac ganglion also causes loss in tonus, but when applied after section of the splanchnic there is an initial increase with a later permanent decrease in tonus. Adrenaline applied to the under surface of a diaphragm whose tonus is reduced causes a marked increase in tonus; when cocaine follows adrenaline a reduction in tonus usually takes place. Section of the vagus is without effect on the tonus, but inhalation of ammonia causes a loss.

G. H. S.

**Toxicity of blood of adrenalectomized frogs.** C. H. KELLAWAY. *J. Pharmacol.* 18, 399-405(1922).—No clear evidence of the presence of any muscarine-like effect was obtained.

C. J. WEST

## G—PATHOLOGY

H. GIDRON WELLS

**Cerebrospinal fluid and blood in multiple sclerosis.** J. B. AYER AND H. E. FOSTER. *Arch. Neurol. Psychiatry* 8, 31-9(1922).—Study of 38 cases of multiple sclerosis indicates that there is no single cerebrospinal fluid test of paramount importance for its diagnosis. The fluid is seldom entirely normal. Unusual findings were obtained in 50% of cases: fluid of normal appearance obtained under normal or low pressure, showing a slight increase in cells (lymphocytes and arachnoid mononuclears), total protein normal or only slightly increased, globulin slight trace or absent, paretic colloidal gold curve with negative Wassermann. This type seems to indicate a progressive stage of multiple sclerosis. Chem. studies revealed no disorders of metabolism.

A. T. CAMERON

**Blood creatinine findings in five cases of corpus striatum disorder.** T. RAPHAEL AND F. C. POTTER. *J. Nervous Mental Diseases* 55, 492-6(1922).—Creatinine values were below normal, indicating the possibility of concomitant alteration of muscle metabolism.

A. T. CAMERON

**Simple goiter.** R. MCCARRISON. *Brit. Med. J.* 1922, I, 636-7.—A review.

A. T. CAMERON

**Etiology and treatment of diabetes.** A. RENSHAW AND T. H. FAIRBROTHER. *Brit. Med. J.* 1922, I, 675-7.—From the stools of diabetics a new organism (*B. amyloclasticus intestinalis*) has been isolated. It splits starchy foods, forming hydroxybutyric acid, diacetic acid, BuOH, and acetone. Sugar also is formed. Acetone has been found in estimable amts. In diabetes, carbohydrate fermentation occurs in the alimentary canal, forming abnormal products which probably so affect the glycogenetic function of the liver as to lead to improper storage therein of the glucose from the alimentary canal during digestion.

A. T. CAMERON

**Evidence of pancreatic disorder in rickets.** E. C. DODDS. *Brit. Med. J.* 1922, I, 511-2.—The diastatic power of the urine is greatly increased in rickets, falling to normal during convalescence. Fat in the feces is increased (75% as compared with 20% in a series of non-rachitic children.) It is suggested that there is a pancreatic lesion in rickets, leading to poor production and absorption of fatty acids and, therefore, poor absorption of Ca. In most cases there is distinct acidosis with presence of acetone bodies in the urine.

A. T. CAMERON

**The nitrogen method as an aid to differential diagnosis in mental disease.** R. V. STANFORD. *Brit. Med. J.* 1922, I, 914-7; cf. C. A. 8, 170.—Using his own method (C. A. 8, 146, 721) requiring 1 cc. cerebrospinal fluid, S. shows that when N is below 0.20 mg. per cc. there is great probability against general paralysis, while if it is above 0.26 mg. there is overwhelming probability in favor. Normal figures vary between 0.15 and 0.22 mg. per cc. Approach to or occurrence of death in general paralysis leads to large increase in N content of the fluid (e. g., increase from 0.25 to 0.39 in 14 months, and 11 days later 1.09 in sample taken 30 min. after death). Hence figures

for fluid obtained post mortem are valueless. Most cases of different mental disorders do not show nitrogen figures for cerebrospinal fluid differing from normal. A. T. C.

**Synovial fluid.** F. MALMEJAC. *Bull. soc. chim. biol.* 4, 190-1(1922).—Two synovial fluids have been examd., one contg. different Gram-staining cocci, the second, Gram-staining diplococci. Both contained a large amt. of true albumin, and a distinct amt. of alkali-albumin. A. T. CAMERON

**Recent metabolic findings in the diagnosis and treatment of diseases of the thyroid gland.** G. S. FAHRNI. *Can. Med. Assoc. J.* 12, 386-9(1922).—Basal metabolic measurements of 105 persons, all suffering from a pathological condition with symptoms suggestive of thyroid disease, showed 36% normal, 59% abnormally high, and 5% abnormally low. A clinical analysis of the cases is given. A. T. CAMERON

**Creatinuria in certain disease conditions.** A. T. CAMERON AND A. GIBSON. *Can. Med. Assoc. J.* 12, 393-400(1922).—Consideration of a case of muscular infantilism (Gibson, C. A. 15, 1758), with examn. of a number of fresh cases with muscle and nerve involvement, of several cases after amputation, and correlation with the literature, leads to the following conclusions: Occurrence of creatinuria is of little value for diagnostic purposes, but changes in the degree of creatinuria are of some value in controlling prognosis and treatment in certain diseases; creatine is converted into creatinine in muscular tissue, this process being necessary to facilitate some carbohydrate change in muscle; creatine is not formed in muscle. A. T. CAMERON

**Pancreatic extract and diabetes.** J. J. R. MACLEOD. *Can. Med. Assoc. J.* 12, 423-5(1922).—A review of the results with concd. pancreatic ext. obtained by Banting, Best, Collip, Campbell, Fletcher, and Macleod himself. A. T. CAMERON

**Experimental production of carcinoma by means of radium.** W. S. LAZARUS-BARLOW. *Proc. Roy. Soc. Med.* 15, Sect. Path., 7-12(1922).—Forty-eight rats were subjected to  $RaBr_2$  treatment, amts. varying from 0.011 to 0.15 mg., in tubes introduced intraperitoneally, treatment lasting up to 279 days. The results were inconclusive, indicating that rats are remarkably resistant in respect of induced cancer. A. T. C.

**The threshold of the kidney.** W. LANGDON BROWN. *Proc. Roy. Soc. Med.* 15, Sect. Therap. and Pharmacol., 1-12(1922).—A review. A. T. CAMERON

**Addison's disease, with severe anemia, treated by suprarenal grafting.** A. F. HURST, W. E. TANNER AND A. A. OSMAN. *Proc. Roy. Soc. Med.* 15, Clin. Sect., 19-20 (1922).—Details of a partially successful case. A. T. CAMERON

**Glucosuria in renal disorders.** G. A. HARRISON. *Proc. Roy. Soc. Med.* 15, Sect. Urology, 39-44(1922).—A summary of methods, with typical cases. When the glucosuria is not of obvious cause, H. recommends obtaining a blood-sugar curve. If this is normal or low the glucosuria is of little moment. A. T. CAMERON

**The chlorine metabolism in pulmonary tuberculosis.** FELIX BOENHEIM. *Beitr. Klin. Tuberk.* 49, 233-8(1921).—There seems to be a parallel between the severity of pulmonary tuberculosis and hypochloremia. Not all cases with hypochloremia reveal a diminished gastric Cl secretion, some cases having normal or superacidity after a Boas test breakfast, indicating that the Cl of the blood is not the decisive factor in gastric secretion. The superacidity may be the result of a stimulation of the living gland cells by toxins. How does the hypochloremia occur? In tuberculosis the Cl mobilization is increased. The majority of cases reveal thyreo-toxic moments (cf. C. A. 15, 2114). Since the gastric secretion is diminished early (probably preceded by a supersecretion), the increased Cl in the blood is excreted by the kidneys and thus removed from the body. There results a paucity in body Cl, "hypochloremia." The cases, in which the gastric secretion is normal or increased with a low blood Cl content, are explained in that the gastric cells are still irritable while the mobilization is so marked

that in spite of this the blood Cl not utilized by the gastric glands is eliminated by the kidneys. A second possible explanation for the hypochloremia may be sought in the anchoring of the Cl in tissue depots. This can only be detd. by Cl detns. on tissues. In order to obtain an insight into the intermediate NaCl metabolism in tuberculosis, cases free from kidney symptoms were examd. for urinary NaCl excretion at 2-hr. intervals. In mild cases the excretion was normal while in severe cases a retention occurred especially in the morning. The H<sub>2</sub>O excretion in moderately severe cases was normal. No NaCl retention occurs upon feeding 10 g. NaCl. In severe cases NaCl administered is excreted slowly, while liquid administered is excreted normally. In severe cases NaCl administered may be only partly eliminated, not even being excreted on the second day—there being a true retention, as high as 30% (3 of 10 g.) can be retained. It is concluded that there is a dechlorinization and resulting Cl starvation of the tissues in tuberculosis.

H. J. CORPER

**Erythrocyte sedimentation in citrated blood in the diagnosis of pulmonary tuberculosis.** GEORG KATZ. *Z. Tuberk.* 35, 401-24(1922).—The sedimentation reaction is not specific for tuberculosis but occurs in pregnancy, lues, malignant tumors, etc. It was found to occur in cases of active, but not in latent, pulmonary tuberculosis and can be considered of some diagnostic value for an active pulmonary tuberculosis provided the numerous other causes for the occurrence of the sedimentation of red blood corpuscles can be ruled out. It is of prognostic import since an increased rate of sedimentation indicates an increased destruction of tissue. The tuberculin reaction does not go hand in hand with the sedimentation reaction.

H. J. CORPER

**Studies on the nature of the action of non-specific protein in disease processes.**  
**III. Non-specific proteins and soluble toxin (diphtheria-tetanus).** D. M. COWIE AND R. M. GREENTHAL. *J. Med. Research* 43, 21-8(1922); cf. *C. A.* 15, 2918.—The protective action of normal horse serum is greater than that of serum pptd. by alc. when injected into guinea pigs which have received a fatal dose of diphtheria toxin. The globulin fraction of horse serum is more effective than the albumin fraction. No protective effect against diphtheria toxin was obtained with the following proteins: egg white, milk, guinea pig serum and rabbit serum. The protective action of normal horse serum against diphtheria toxin is probably due to natural antitoxin in the serum and not to the non-sp. protein injected.

E. B. FINK

**An experimental study on the effects of protein injections upon infections.** ISIDOR KROSS. *J. Med. Research* 43, 29-36(1922).—The treatment of white rats with foreign proteins did not increase their resistance to mouse typhoid, to general peritoneal sepsis or to pneumonia, nor did it enable them to overcome infection any better than normal animals. In fact, the treatment apparently reduced the vitality of the animals as is evidenced by their more rapid destruction. Furthermore, the danger of death from anaphylactic shock is such as to stamp this method of treatment as actually threatening great potential harm.

E. B. FINK

**The influence of tuberculin upon the production of antibodies.** H. L. THOMPSON. *J. Med. Research* 43, 37-43(1922).—The injection of tuberculin increases the production of antibodies to foreign erythrocytes, probably by irritating the endothelial phagocytes particularly of the liver and spleen.

E. B. FINK

**Experiments upon immunity to tumor growth.** HELRN CHAMBERS, GLADYS M. SCOTT AND S. RUSS. *Lancet* 1922, I, 212-6.—These exptl. results confirm and extend previous work upon the immunity to tumor growth which can be set up in animals by irradiated tumor cells. If the processes controlling the growth of tumors in animals have an analogy in man, then these observations appear to have 2 bearings upon the treatment of malignant disease. The first is that some degree of immunity may result from the adequate irradiation of a malignant tumor in the body, but to insure

this in practice is generally a matter of great technical difficulty. The second is that the treatment of a patient with irradiated tumor cells, after the removal of the growth surgically, may set up a state of resistance to the disease. E. B. FINK

**A precipitation test for syphilis.** C. Y. WANG. *Lancet* 1922, I, 274-6.—In the test described an alc. ext. of human heart is used as antigen. The results obtained compare favorably with those obtained with the Wassermann reaction. E. B. F.

**The etiology of gout.** L. J. LEEWELLYN. *Lancet* 1922, I, 475-8.—Gout is purely hereditary. A tendency to cellular sensitization is the pathological groundwork of the disorder—latent gout. Gout is evoked by the corresponding protein or antigen, whether animal, vegetable, bacterial or other. It exerts its effects through the medium of vascular endothelial poisoning, with tonus of unstriated muscle, especially the bronchioles. The same finds its clinical expression in the regular and so-called irregular manifestations of gout. E. B. FINK

**Alkalipenia.** A. D. SYMONS. *Lancet* 1922, I, 627-31.—The following nomenclature is suggested to indicate varying degrees of acidosis: A. Body alkali reserve (1) Almost exhausted = acidosis. (2) Partially depleted = alkalipenia. (3) Slightly increased = alkalosis. B. Acetone bodies present = ketosis. Varying grades of alkalipenia may be designated by the terms mild, moderate or severe. A rough test of the degree of alkalipenia may be obtained by detg. the amt. of  $\text{Na}_2\text{CO}_3$  given by mouth necessary to render the urine alk. Normally about 5 g. is required. The results of such tests in a series of cases are given. E. B. FINK

**An experimental investigation of the corpus luteum in its relation to the toxemias of pregnancy.** R. L. M. WALLIS AND H. G. E. WILLIAMS. *Lancet* 1922, I, 784-5.—A chem. substance has been isolated from the corpus luteum which produces necrosis and other changes in animals very similar to those found in the toxemias of pregnancy. The substance was extd. with alc., was protein-free and the ext. contained no cholesterol, choline, histamine or tyramine. This substance is not present in the placenta nor was it found in an hydatiform mole. The overproduction of this substance is the cause of the toxemias of pregnancy and the results emphasize the important functions of the corpus luteum in pregnancy. E. B. FINK

**A review of the work done by the Glasgow School on the etiology of rickets.** LEONARD FINDLAY. *Lancet* 1922, I, 825-31.—The most important conclusion derived from expts. and clinical observation has been that in some way confinement and defective hygiene are the most potent factors in the production of rickets and that the disease is intimately associated with housing conditions. Diet plays a subsidiary part, if any part at all. E. B. FINK

**The formation of heterogenetic antigen by combination of hapten and protein.** K. LANDSTEINER. *Proc. Acad. Sci. Amsterdam* 24, 237-8(1922).—By combining an alc. ext. of horse kidney (hapten) with ten times dild. pig serum (protein contg. no heterogenetic antigen) an antigen was obtained which, when injected into rabbits, led to the production of hemolysins for sheep corpuscles. E. B. FINK

**Heterogenetic antigen.** KARL LANDSTEINER. *Verslag Akad. Wetenschappen Amsterdam* 29, 1118-21(1921); *Proc. Acad. Sci. Amsterdam* 23, 1166-9(1921).—There are present in the organs of various animal species, substances which produce antibodies, such as hemolysin for sheep corpuscles when injected into other species. These substances may be divided into two fractions; one an alc.-sol. portion, probably of a lipid nature, has the property of reacting specifically *in vitro*, but is devoid of antigenic properties. For this substance the term *hapten* is suggested. Only the entire complex (hapten plus protein) acts as an antigen. E. B. FINK

**Sulfhemoglobinemia.** A. A. HIJMAN VAN DEN BERGH. *Verslag Akad. Wetenschappen*

*schappen Amsterdam* 29, 1181-8(1921); *Proc. Acad. Sci. Amsterdam* 23, 1392-8(1921).—Three types of cyanosis are recognized: septic sulfhemoglobinemia with hemolysis; intraglobular methemoglobinemia and intraglobular sulfhemoglobinemia. This report deals with some observations on the latter in a case of Hirschsprung's disease. There must be 10% sulfmethemoglobin in the blood to be measured spectroscopically. If sulfmethemoglobinemia is due to absorption of  $H_2S$  from the large intestine there must be some other, as yet unknown, factor necessary, because the conditions found in Hirschsprung's disease favor the production of large quantities of  $H_2S$  and there was no marked sulfmethemoglobinemia or cyanosis in this case.

E. B. FINK

The nature of the tuberculin reaction. H. SELTER. *Z. Immunität.* 32, 325-54 (1921); cf. *C. A.* 16, 1617.—The tuberculin reaction is not an antibody reaction because there are no antibodies capable of combining with tuberculin in a tuberculous individual. Tuberculin acts as an irritant and is not necessarily changed in the body. Its action is not changed after heating to  $150^\circ$ . Tuberculin is not an antigen and possesses no immunizing action. Treatment of tuberculous animals with sublethal doses does not protect against a lethal dose. Tuberculin sensitivity cannot be transferred passively. It is bound not only at the site of infection but in all the tissues by an allergic body of undetermined nature. Tuberculin produces a sp. inflammatory reaction in tuberculous tissues; other bacterial poisons and proteins act in a non-sp. manner. Tuberculin sensitization is induced only by infection with living tubercle bacilli. Dead tubercle bacilli in large doses produce a tubercle bacillus protein anaphylaxis which is distinct from tuberculin sensitization.

E. B. FINK

Studies of liver function. III. Phenol conjugation as influenced by liver injury and insufficiency. K. F. PELKAN AND G. H. WHIPPLE. *J. Biol. Chem.* 50, 513-26 (1922).—By Pelkan's methods (*C. A.* 16, 1441) the total and free phenols in the blood of dogs were detd. before and after the ingestion of *p*-cresol. The increase in free phenols divided by the difference in total phenols is regarded as a measure of phenol conjugation. This was not affected by bleeding periods, by the presence of a biliary fistula or by a distemper that was subsequently fatal. After the establishment of an Eck fistula, however, this ratio may fall to  $1/3$  or even 0.1 the normal and, if the hepatic artery is also tied, to 3 or 5% of the normal. The effect of liver injury due to  $CHCl_3$  or to P depends upon the extent of the injury, being negligible if the injury is slight but increasing with the extent of the hepatic injury until with fatal injury ( $CHCl_3$ ) the ratio approaches zero.

I. GREENWALD

Some practical aspect of the diagnosis and treatment of diabetes mellitus. W. Y. BERKLEY. *Am. Med.* 28, 317-23(1922).—Of medical interest.

F. S. HAMMETT

Serological studies with antigens and antibodies on the surviving artificially perfused liver. III. M. HAHN AND E. V. SKRAMLIK. *Biochem. Z.* 130, 80-5(1922); cf. *C. A.* 15, 1565.—When agglutinins are perfused through the liver in small amts. for a long time they are taken up by the liver tissue and cannot be mechanically recovered. Typhus agglutinin is taken up in much greater amts. than is coli agglutinin. The agglutinins act as poisons to the cells of the organ perfused. Large amts. of protein gradually accumulate in the perfusate. If homologous bacteria are circulated through a liver which has been perfused with their agglutinins for 1 hr. and then completely washed out with Ringer soln. agglutination takes place in the capillaries. The bacterial count of the circulating fluid falls markedly.

F. S. HAMMETT

The sensitivity of antibodies to ether. J. FORSSMAN. *Biochem. Z.* 130, 154-64 (1922).—Using sera and corpuscles from various species, including man, F. found that the Wassermann substance which is pptd. from positive sera and sol. in NaCl and  $Na_2CO_3$  soln. is destroyed by treatment with  $Et_2O$  and subsequent inactivation. Normal sheep hemolysin of human sera, whether in the serum or pptd. therefrom and dis-

solved in  $\text{NaCl}$  and  $\text{Na}_2\text{CO}_3$ , shows the same response to the same treatment. Immune sheep hemolysin from rabbit serum acts similarly when dissolved in  $\text{NaCl}$  and  $\text{Na}_2\text{CO}_3$ . The agglutinins, both the normal against guinea-pig corpuscles in ox-serum and the typhus agglutinin of rabbit serum, react only slightly, if at all, to the  $\text{Et}_2\text{O}$  treatment. This reaction is believed to be an adsorption not stereochemical. F. S. H.

**Postmortal fat emboli in the lungs.** F. NEUREITER AND G. STRASSMANN. *Deutsches Z. ges. gerichtl. Med.* 1, 204-16 (1922).—Apparently fat emboli can accumulate in the lungs after death and circulatory stoppage. F. S. HAMMETT

**Diabetes insipidus, its pathogenesis and therapeutics.** T. STENSTRÖM. *Endocrinology* 6, 365-82 (1922).—A report of the amt., freezing point, total N and NaCl excretion of urine in a patient with diabetes insipidus together with a discussion of similar expts. by others. The conclusion is made that the renal secretory power for NaCl and N is not necessarily limited and that ordinarily only NaCl need be reduced. Pituitrin injections raise the concn. of the urine simultaneously with the diminution of vol., thereby restoring the kidneys to a partially normal state. But the concn. does not in every case rise in proportion to the diminution in quantity and a certain NaCl retention occurs. F. S. HAMMETT

**Relation of blood platelets to the in vivo agglutination of bacteria and their disappearance from the blood stream.** C. G. BULL AND C. M. MCKEE. *Am. J. Hyg.* 2, 208-24 (1922).—Injection of bacterial suspensions into the circulation of immunized rabbits or of normal rabbits possessing natural agglutinins is followed by immediate agglutination of the bacteria and their rapid disappearance from the blood stream. Blood platelets, when present, become attached to a majority of the bacterial clumps; but both the agglutination and the disappearance of the bacteria from the blood stream occur just as completely and rapidly in both normal and immunized animals when platelets are absent. While suspensions of *Staphylococcus aureus* are not agglutinated by injection into the blood stream of normal rabbits, yet the bulk of the cocci rapidly leave the blood stream. Platelets, when present, collect into clumps to which many of the cocci adhere before leaving the circulation. The cocci leave the circulation just as rapidly when platelets are not present; the plasma so alters the cocci that they adhere to the endothelial cells of the capillaries. Virulent pneumococci are neither agglutinated nor opsonized by the blood of normal rabbits, and therefore remain in the circulation. The antibody content of the blood governs the phenomena of artificial bacteremias: "(1) The bacteria are neither agglutinated nor opsonized and continue to circulate in the blood stream; (2) the bacteria are agglutinated, or are both agglutinated and opsonized, and rapidly leave the circulating blood and collect in the capillary systems of the liver, spleen, lungs, etc.; or (3) the bacteria are not agglutinated, but are opsonized and rapidly leave the circulating blood and likewise collect in the internal organs." JOSEPH S. HEPBURN

**Experimental production of tar cancer in white mice.** JOHANNES FIBIGER AND FRITJOF BANG. *Kgl. Danske Videnskab. Selskab. Biolog. Medd.* 3, No. 4, 1-40 (1921).—Coal tar from the same lot was applied every 2 or 3 days to the same spot of the skin of the back between the scapulas. This treatment was continued for a prolonged period of time, e. g., 7 to 9 months. The symptoms produced were loss of hair at the spot, thickening of the skin, slight inflammatory changes, formation of small fissures or a crust, development of papillomatous growths and cutaneous horns, and, finally, infiltration and ulcers. Of 26 mice, which survived for at least 180 days after the first painting, 22 developed carcinoma and 2 carcinosarcoma. Metastases were present in the axillary lymphatic glands of 6 of these 24 mice, and were also present in the lungs of 2 of the mice. The tar carcinomata was found to be transplantable to other mice. The carcinomata continued to grow without diminution after the cessation of painting



with tar. Since the tar used contained only 0.0003% As, its compds. are excluded as the active cancer-producing element in the tar.

JOSEPH S. HEPBURN

Is sugar the main cause of dental caries? ALBERT PARLIN. *Dental Cosmos* 64, 773-5(1922).—In order to throw light upon the possible relationship between the consumption of carbohydrates and the occurrence of dental caries, it is suggested that statistics be collected concerning the development of *new cavities* in the teeth of diabetics who have been on a practically carbohydrate-free diet for several years. It is further suggested that patients with sugar-free urines be tabulated separately from those still showing glucosuria.

JOSEPH S. HEPBURN

Some observations on the epinephrine hydrochloride test (Goetsch test) in a group of normal individuals. WILLIAM P. VAN WAGENEN. *J. Ind. Hyg.* 3, 343-8(1922).—A positive reaction to epinephrine-HCl is detd. by the following factors, which are stated in the order of their relative importance: general objective and subjective symptoms, pulse rate curve, blood pressure curve, and local reaction. The blood pressure curve is of essentially the same type in negative cases, in positive cases among normal subjects, and in known cases of hyperthyroidism, but shows quantitative differences. The general symptoms differ only in quantity in the 3 groups of cases. It is unlikely that reliance can always be placed upon the test in cases in which hyperthyroidism cannot be diagnosed by clinical observation. Fifty normal college students were used as subjects.

JOSEPH S. HEPBURN

Glucosuria in diabetics after exceeding tolerance. P. A. STEENSMAN. *Ned. Tijdschr. Geneesk.* 2, 312-5(1919); *Zentr. Biochem. Biophys.* 21, 503(1919).—Study of 100 cases of diabetes showed that not all the carbohydrate in excess of the tolerance was excreted unburned. Each diabetic had his own tolerance; when this was exceeded from 10% to 30% of the excess carbohydrate was excreted. When the tolerance was further exceeded, the unburned sugar excreted in the urine amounted to more than 100% of the excess. In prognosis, consideration must be given, not only to the tolerance and the tolerance curve, but also to the urinary sugar produced from ingested protein by intermediary metabolism and equal to approx. 59% of that protein. In acidosis, carbohydrates should be given in abundance; for instance, when 200 g. of carbohydrate have been administered, 120 g. have repeatedly been assimilated. The suggestion is made that so-called renal diabetes is due simply to a gradual increase in the tolerance curve; the tolerance is markedly increased with little or no increase in the excretion of carbohydrates. This theory harmonizes with the absence of distinct change in the sugar content of the blood in renal diabetes.

JOSEPH S. HEPBURN

Action of hirudin upon anaphylaxis produced by injection of horse serum into a guinea pig sensitized by means of that serum. E. ZUNZ AND M. VAN GEERTRUYDEN-BERNARD. *Réunion. soc. belge biol.* 1921, 287-8; *Physiol. Abstracts* 6, 190(1921).—The min. lethal dose of horse serum is increased by intravenous administration of hirudin (2 to 4 mg.) to a guinea pig, which has been sensitized subcutaneously or intraperitoneally from 2 to 3 weeks previously, from 0.5 to 4 hrs. prior to injection of the anaphylactic dose of horse serum. It is also increased if the hirudin (2 mg.) and horse serum (7 cc.) be mixed 3 or 4 hrs. prior to their injection. This attenuation of anaphylaxis may be obtained for doses slightly greater but not for doses markedly greater than the lethal dose. This attenuating action of hirudin apparently is less when anaphylaxis is produced by reinjection of a heterologous serum, than when it is caused by injection of a homologous serum which has been previously treated with agar.

JOSEPH S. HEPBURN

Human arteriosclerosis: some remarks concerning its etiology and symptomatology. GEO. W. NORRIS. *Trans. Coll. Physicians Philadelphia* [3] 42, 13-20 (1920).—Pb and possibly tobacco may be etiological factors; the role of alc. is doubtful.

**Autointoxication** is neither a const. nor even a frequent factor. The part played by disturbances of the endocrines is largely speculative and not explanatory of the basic cause of the disease. Overindulgence in food, especially protein food, has deleterious results. The withdrawal of proteins and the restriction of food generally to the point at which only the nutritive needs are supplied are frequently followed by a great amelioration if not an actual disappearance of the symptoms of hypertension. J. S. H.

**Principles of therapy in human hypersensitiveness.** R. A. COOKE. *Trans. Coll. Physicians Philadelphia* [3] 42, 52-67(1920).—A comprehensive summary of the symptoms, causes, diagnostic tests, and therapy of *allergy* in its various forms.

JOSEPH S. HEPBURN

**Osteitis deformans: Paget's disease of the bones.** J. C. DACOSTA. *Trans. Coll. Physicians Philadelphia* [3] 42, 455-81(1920).—Mütter lecture for 1920. Paget's disease is apparently a distinct malady though closely related to osteomalacia and von Recklinghausen's disease. Late cases of Paget's disease show metabolic changes the reverse of those found in osteomalacia. Endocrine disturbances may be an etiological factor.

JOSEPH S. HEPBURN

**Anticomplementary properties observed in certain serum reactions.** A. M. WRIGHT. *Trans. Proc. N. Zealand Inst.* 53, 484-6(1921).—In the detn. of approx. 10,000 Wassermann reactions, the most satisfactory and concordant results were obtained with an antigen prepd. from cholesterol and an ext. from the fresh muscle of the human heart. This antigen exerts but little inhibitory action upon the complement. Normal human sera usually possessed anticomplementary properties, and produced, on the av., complement deviation equal to 0.5 min. hemolytic dose of complement. A highly anticomplementary serum lost its anticomplementary properties when kept in the frozen state for 2 months. Blood was drawn from 59 malaria patients either during or immediately after a rigor; their sera invariably gave a negative Wassermann reaction. Chloroform anesthesia had no influence on the Wassermann reaction. J. S. H.

**Relation between the viscosity of blood and the ratio of uric acid in serum to that in whole blood.** ROUZAUD AND THIÉRRY. *Compt. rend. soc. biol.* 85, 962-4(1921).—The viscosity of blood, which depends on the number of red cells, detrs. the distribution of uric acid between plasma and corpuscles. In patients with excessively viscous blood, the serum contains proportionally less uric acid than in patients with less viscous blood; in the latter, whether anemic or hydremic, the amt. of uric acid in the serum may occasionally exceed that in the whole blood. J. C. S.

**Plasma chlorides and edema in diabetes.** R. M. WILDER AND C. BEBLER. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 287-8(1921).—Patients with the lowest ash plasma Cl values and the most marked lowering of the Cl threshold are those manifesting the peculiar edema of diabetes. The disappearance of such an edema is accompanied by the elevation of the threshold to normal or nearly normal values.

J. F. LYMAN

**Oxygen consumption during repeated slight hemorrhages.** H. H. SCHLOMOVITZ, E. RONZONE AND B. H. SCHLOMOVITZ. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 288-9(1921).—After hemorrhage in dogs no appreciable decrease in the rate of  $O_2$  absorption occurs until 15 to 25% of the total blood has been lost. J. F. LYMAN

**Elective localization of bacteria following various methods of inoculation, and the production of nephritis by devitalization and infection of teeth in dogs.** E. C. ROSENOW AND J. G. MEISSNER. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 443-5(1922).—Intravenous injection is not essential for bacteria to localize in the tissue for which they have elective affinity. Characteristic localization has been obtained repeatedly following other methods of inoculation. J. F. LYMAN

**Ammonia, a causative factor in meat poisoning in Eck fistula dogs.** S. A. MAT-

THEWS. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 459-60(1922).—It is suggested that at least one of the causative factors in meat poisoning in Eck fistula dogs is the absorption of ammonia from the stomach due to food decompn. J. F. LYMAN

The catalase content of normal and atrophied muscles. A. E. GUENTHER AND S. MORGULIS. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 475-6(1922).—Muscles in one leg of a rabbit were caused to atrophy by cutting the sciatic nerve. The atrophied muscle contained a higher % of catalase than its normal mate, and approx. the same abs. amt. It seems therefore that muscle catalase does not autolyze and diffuse into the blood stream. It seems to belong to the more stable cell constituents. J. F. LYMAN

The relation of parathyroid tetany to intestinal bacteria. L. R. DRAGSTEDT. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 483(1922).—Parathyroidectomized dogs lived 10 days (av.) after the operation and at no time gave symptoms of tetany provided an aciduric intestinal flora had been established and was maintained by the use of a diet of bread and milk + lactose. It is suggested that the normal function of the parathyroids is in part the removal or neutralization of toxic substances in the blood. J. F. LYMAN

Agglutination by ricin. J. A. GUNN. *Proc. Physiol. Soc., J. Physiol.* 54, lxxxviii (1921).—Ricin will cause agglutination of other substances than red blood corpuscles, e. g., cholesterol suspensions and carmine suspensions. Agglutination by ricin is partly, at least, non sp. and is of the nature of the pptn. of one colloid by a colloid of opposite sign. Cobra venom and Daboia venom agglutinate cholesterol suspensions. A relation is suggested between the physiol. activity of toxins and their capacity to act as positively charged colloids. J. F. LYMAN

Anaphylaxis and immunity "in vitro." H. H. DALE AND C. H. KELLAWAY. *Proc. Physiol. Soc., J. Physiol.* 54, cxliii(1921).—A guinea pig is rendered highly sensitive to egg albumin by injecting a small dose, 0.5 cc., of serum from a rabbit immunized against that protein, and leaving a few days for the disappearance of the antibody from the circulation and its fixation by the body cells. The guinea pig is then killed and the uterus perfused free from blood with warm Ringer soln. One horn of the uterus, suspended in oxygenated Ringer soln., responds to egg albumin in very low concn. (1 in 1 to 10 millions). The other horn is suspended in Ringer soln., to which is added 1 part in 40 of the same rabbit's antiserum as was used to produce "passive" anaphylaxis. In this soln. no response occurs to amts. of egg albumin which caused large contraction in the other horn. When removed to plain Ringer soln. containing egg albumin it responds as well as the first horn. Antibody in the plain muscle cells renders them acutely sensitive to the corresponding antigen; excess of antibody in the fluid bathing them protects them from the antigen though they are sensitive. J. F. L.

Hemorrhage as a form of asphyxia. H. W. HAGGARD AND Y. HENDERSON. *Proc. Physiol. Soc., J. Physiol.* 56, xi(1922).—The symptoms seen in dogs after hemorrhage by bleeding until blood pressure falls to 28-30 mm. Hg. are identical in many respects to those seen in animals breathing under a progressively lowered  $O_2$  tension. In both cases there is rapid breathing, low alveolar and blood  $CO_2$  and a relative alkalosis of the blood. J. F. LYMAN

The theory of the Meinicke reaction (third modification, D. M.). R. BAUER AND W. NYIRI. *Z. Immunität* 33, 325-47; *Wiener klin. Wochschr.* 34, 427-8, 548-9(1921); cf. C. A. 15, 113, 114, 3139, 3672, 3683.—The authors report the following findings of their physicochem. studies on the mechanism of the M. R.: The particles of the lipoidal antigen soln. do not carry a negative charge. A weak negative charge is carried by the protein particles of both normal and luetic sera, presumably because of the slightly acid dissociation of the serum protein, and no quant. difference is demonstrable between the 2 sera. The addition of alk. buffer solns. to the sera did not affect the sub-

sequent flocculation, although the negative charge of the protein particles was thereby increased. Also the imposition of positive charges upon the protein particles failed to cause flocculation in either the normal or syphilitic serum. The second paper is a reply to Epstein and Paul, see abstract below.

W. A. PERLZWEIG

**The theory of the Meinicke reaction (D. M.).** EMIL EPSTEIN AND FRITZ PAUL. *Wiener klin. Wochschr.* 34, 546-8(1921).—Polemic with Bauer and Nyiri, cf. preceding abstract.

W. A. PERLZWEIG

**Phagocytosis as an expression of the life of leucocytes.** J. DE HAAN. *Arch. ges. Physiol. (Pflüger's)* 194, 448-67(1922).—The only physiol. medium for rabbit polymorphonuclear leucocytes is normal, undil., homologous blood serum; in this the cells remain active for a longer period than in physiol. saline, Ringer soln., serum filtrates, serum dilns., or in fluids containing other colloids. Under certain conditions, and within limits, the capacity of the leucocytes to phagocytize can be taken as a measure of the life of the cells.

G. H. S.

#### H—PHARMACOLOGY

ALFRED N. RICHARDS

**Oligodynamic actions.** J. H. HRESTERMANN. *Tijdschr. vergelij. Geneeskunde* 7, 89(1922).—Oligodynamic phenomena, such as bacterioid action, hemolysis and inactivation of enzymes, are caused by metals, such as Cu, Ag and Hg, which are almost insol. in the medium in which they act. H. believes that very small quantities of these metals can be dissolved, thus causing the action described. He disproves Saxl's theory which assumes an unknown radiation.

R. BEUTNER

**Disturbances in mammalian development produced by radium emanation.** HALSEY J. BAGG. *Am. J. Anal.* 30, 133-61(1922).—Decided developmental arrests occurred in the differentiation of the nervous and reproductive systems of rat embryos exposed to irradiation towards the end of pregnancy. Marked areas of extravasation were produced in subcutaneous connective tissue, indicating that Ra Em action may be selective upon the endothelium of blood vessels. Gamma-ray radiation is found very suitable for such studies.

A. T. C.

**The effect of tartar emetic on the eggs and miracidia of *Bilharzia hematobia*.** M. KHALIL. *Proc. Roy. Soc. Med.* 15, Sect. Tropical Dis. and Parasitology, 13-5(1922).—Isotonic solns. of NaCl, Na<sub>2</sub>SO<sub>4</sub> and tartar emetic prevent hatching of *Bilharzia* eggs. Subsequent diln. allows normal hatching. The action of tartar emetic is, therefore, not directly on the eggs. Their hatching depends on the osmotic concn. of the surrounding medium. Miracidia are not affected by tartar emetic in diln. approx. that used during treatment.

A. T. CAMERON

**Di-iodyl and its action on the blood picture.** HEINRICH FISCHER. *Beitr. klin. Tuberk.* 49, 76-89(1921).—Di-iodyl, 0.3 g., taken 3 times a day produces either a lymphocytosis or a lymphopenia; prolonged administration or larger doses (3 times daily 0.6-0.9 g.) produce a lymphopenia. To prevent a lymphopenia it is advisable in weak patients to start with small doses and to discontinue the drug for 8 days at 3-week intervals. The absence of gastric symptoms and ready adsorption indicate di-iodyl as especially valuable in tuberculosis and syphilis.

H. J. CORPER

**Studies of uranium poisoning.** H. T. KARSNER, TSUN CHEE SHEN AND S. A. WAHL. *J. Med. Res.* 43, 1-19(1922).—Guinea pigs in light are more resistant to uranyl nitrate poisoning than those in darkness. Increased intensity of light emphasizes the difference in resistance exhibited by animals in light and darkness. The difference in resistance is not due to any increased metabolism resulting from increased bodily activity, nor is it due to those penetrating rays which can be removed by a colorless glass filter. Rosin renders animals in the light less resistant to uranyl nitrate poisoning than are those

in darkness. This leads to the suggestion that the differences noted without eosin are not due to light as such but probably to superior nutritional and general living conditions in light as compared with darkness.

E. B. FINK

The pharmacology of oxidizing substances. VII. The rapid formation of aortic nodules and the mechanism of pulmonary edema following the resorptive action of chloramine. RUDOLPH JÜRGENS. *Z. ges. expul. Med.* 25, 123-49(1921).—In rabbits a preliminary injection of atropine increases the resistance of the animals to chloramine. In animals treated with chloramine circumscribed areas of injury were found in the intima of the aorta.

E. B. FINK

Comparative action of some acute poisons of various arsenic compounds. E. MENEGHERTI. *Arch. sci. biol.* 1, 273-330(1920); *Physiol. Abstracts* 6, 153.—Expts. were made with  $As_2O_3$ ,  $Na_2HAsO_4$ , and atoxyl. Intravenous injections of increasing quantities of  $As_2O_3$  starting with a dose somewhat larger than the smallest which may still be fatal, allow rabbits to survive for some days until a dose is reached beyond which the smallest increase kills the animals in a few mins. or hrs. Intravenous injections of  $As_2O_3$  are immediately followed by symptoms of acute poisoning.  $Na_2HAsO_4$  acts at first in the same way, but when larger doses are reached the periods of survival vary greatly. Death is not so rapidly produced as with  $As_2O_3$ . Injected intravenously, symptoms of acute poisoning do not occur. Death is never caused suddenly even by the use of very large doses of atoxyl, but acute symptoms follow its intravenous injection. The fatal doses correspond to 0.0037 g. of As per kg. of body wt. in the case of  $As_2O_3$  and  $Na_2HAsO_4$ , and to 0.0720 g. in the case of atoxyl. Cf. *C. A.* 15, 3686.

H. G.

Biologic action of fluorescent substances. S. REBELLO. *Compt. rend. soc. biol.* 83, 884-6, 886-8(1920); *Physiol. Abstracts* 6, 227.—To det. whether the action of fluorescent substances on organisms in the light is due to the production of toxic substances or to photodynamic action in which the fluorescent substance acts as a sensitizer, bulbs of *Hyacinthus orientalis* were grown in flasks contg. solns. of the fluorescent substance, with the roots of the plant dipping into the soln. The exptl. arrangement is described in the first paper. In the second paper the results of expts. with eosin are recorded. This was used in solns. of diff. concns. varying from 0 to 800 mg. per l. Conclusion: The action of eosin in light is not to be ascribed to the formation of toxic substances. H. G.

Fate of morphine in animal organism. II. K. TAMURA. *Mitt. med. Fak. Univ. Tokyo* 23, 189-217(1920); *Physiol. Abstracts* 6, 153; cf. *C. A.* 15, 2310.—In the Japanese water-frog (*R. nigromaculata*) the increased reflex excitability and tetanus induced by morphine injections may last for several days; this effect appears more slowly, but is always more marked and more prolonged, at low than at high (room) temps. Nitrosomorphine, and especially its split products, have not such a prolonged action as the hydrochloride. These results further substantiate T.'s view on the subject—namely, that the excitatory stage of morphine poisoning is due, not to the alkaloid itself, but to the products of its oxidation.

H. G.

The seat of the emetic action of the digitalis compounds. R. A. HATCHER AND SOMA WEISS. *Arch. Intern. Med.* 29, 690-704(1922).—The digitalis compounds do not induce vomiting when applied directly to the vomiting center (floor of fourth ventricle) nor does perfusion of the head with blood contg. ouabain induce vomiting. Even if the medulla is perfused with unpoisoned, dild., defibrinated blood, addition of ouabain to the blood circulating through the rest of the animal is promptly followed by vomiting. The administration of digitalis was not followed by vomiting if all nerve connections between heart and medulla had been severed. The afferent impulses from the heart which ordinarily induce vomiting after the administration of digitalis probably travel chiefly by the sympathetic and partly by way of the vagus.

I. GREENWALD

**The pharmacological action of adrenaline on the sphincter pylori of the fetus.** P. G. SHIPLEY AND K. D. BLACKFAN. *Bull. Johns Hopkins Hosp.* 33, 159-62(1922).—Strips of pylorus removed from a pig fetus contracted rhythmically in a bath of Ringer soln. The addition of adrenaline lengthened the period between contractions and even caused them to disappear entirely.

I. GREENWALD

**The action of pilocarpine on the glycogen content of organs.** C. HORNEWMANN. *Biochem. Z.* 122, 269-73(1921).—Using dogs as the exptl. animal H. found that pilocarpine hyperglucemia is not inhibited by the simultaneous administration of  $O_2$ . Moreover, during this hyperglucemia most of the glycogen disappears from the liver and partially from the muscles.

F. S. HAMMETT

**Caffeine excretion in the urine after tea and coffee drinking by man.** K. OKUSHIMA. *Biochem. Z.* 129, 563-9(1922).—Hourly detns. of the caffeine excretion were made. No particular difference was observed between the effects of tea and coffee. In the 1st hour after ingestion only a small amt. is excreted; during the 2nd hr. the rate of excretion rises; it reaches its max. at the 3rd or 4th hr. After that the excretion gradually decreases although persisting for 8 or 9 hrs. When liquids are taken during the expt. the caffeine excretion rises until the 6th or 7th hr. after ingestion. Individual variability is not marked even when the cerebral stimulation effect is quite different. F. S. H.

**The action of sublimate, phenol and quinine on yeast.** G. JOACHIMOGLU. *Biochem. Z.* 130, 299-48(1922).—Using the detn. of the  $CO_2$  evolution as the method of testing, J. found that the results of the addition of varying concns. of  $HgCl_2$ ,  $C_6H_5OH$  or quinine to yeast cultures did not confirm the studies of H. Schulz (*Arch. ges. Physiol.* (Pflüger's) 42, 517(1888)), for none of the compds. used accelerated fermentation when present in small amts. Hence it appears that the Arndt-Schulz law does not express the action of all poisons.

F. S. HAMMETT

**Comparative studies of the action of some saponins on red blood corpuscles and trypanosomes.** Y. WADA. *Biochem. Z.* 130, 299-303(1922).—Extended tabular presentation demonstrating that cyclamine is the most strongly hemolytic of the saponin substances. In general the order of toxicity effect is the same for the trypanosomes as for the hemolytic action of the various compds. studied.

F. S. HAMMETT

**The distribution of cinchona alkaloids in the mammalian organism.** E. BOECKER. *Biochem. Z.* 130, 312-20(1922).—Quinine was subcutaneously injected into guinea pigs and the lungs and liver were roughly analyzed for the drug from 1 to 48 hrs. later. In order to det. whether the organ content of the compd. is related to relative organ size or independent of this and related to some specific property characteristic of the organ in question. The lungs held up more quinine than the liver both absolutely and relatively. Similar results were obtained when quinine and optochin were given by mouth.

F. S. HAMMETT

**Pharmacological and pharmacodynamic study of the strophanthin glucosides: strophanthin and ouabain.** M. TRIFENEAU. *Bull. sci. pharmacol.* 29, 184-90, 244-9 (1922); cf. *C. A.* 16, 1988.—The lethal toxicity of ouabain given intravenously is 0.23 mg. per kg. for the rabbit. A dose of 0.21 mg. is at times fatal, one of 0.20 mg. is not. The drug does not change its toxic power when kept in the cryst. state, nor does sterilization by autoclave in neutral or saline solns. destroy its action. Observations on the exposed heart of the dog during acute ouabain poisoning demonstrated 3 phases of reaction: (1) A slowing, due to stimulation of the vagal centers, lasting from the 2nd to the 5th min. and not occurring after bilateral vagotomy; (2) a phase of acceleration, in which the rhythm regains and passes its normal rate, accompanied by arrhythmias and auricular-ventricular dissociation; (3) a phase of fibrillation ending in death. The lethal dose (cardiac arrest in 10 to 20 mins.) for the dog is between 0.14 and 0.15 mg. per kg. body wt. given intravenously. Crystallized strophanthin is more toxic, killing in a

dose of 0.11 mg. per kg. Amorphous strophanthin is less toxic, the lethal dose varying from 0.17 to 0.19 mg. F. S. HAMMETT

Historical and pharmacodynamic study of piloselle (*Hieracium pilosella*). H. LÉCLERC. *Bull. sci. pharmacol.* 29, 307-11(1922).—Produces diuresis without causing irritation of renal epithelium. F. S. HAMMETT

The use of pituitary extracts by mouth in the treatment of diabetes insipidus. M. H. REES AND W. H. OLMSTED. *Endocrinology* 6, 230-4(1922).—The history, physical and laboratory findings in a case of diabetes insipidus are given. The progress of the patient under various types of treatment is recorded. By giving desiccated posterior lobe substance in salol-coated capsules the polydipsia and polyuria were as effectively controlled as with hypodermic injections of pituitary extract. F. S. H.

The effect of serial administration of silver arsphenamine on the kidney. D. M. SIDLICK AND M. L. MALLAS. *N. Y. Med. J.* 115, 540-1(1922).—Urea, non-protein N and creatine detns. on the blood, and albumin and microscopic tests on the urine were made before and after treatment with Ag arsphenamine. No untoward effects of the drug were observed. F. S. HAMMETT

Postscript to: direct application of poisons to the spinal cord of the frog. C. G. SANTERSON. *Scand. Arch. Physiol.* 41, 31-2(1921); cf. C. A. 15, 900.—Symptoms, similar to those found with curare, occurred with strychnine. F. S. HAMMETT

Chemical stimulation of the skin. F. LEBERMAN. *Z. Biol.* 75, 239-62(1922).—Different regions of the body are differently sensitive to chem. stimulation. The lips and skin of the scrotum are the most sensitive. The distal portions of the extremities are the least sensitive. The sensation is expressed as a burning or itching. The most potent stimulus was acetic anhydride; acetic acid was less effective and formic acid the least. No sepn. of specific itch or burn sensitive spots was obtainable. Cold lowers, and heat increases, the sensitivity possibly because of circulatory changes. The same can be said of the pressure influence. The reaction time is apparently not dependent on the strength or place of the stimulus. F. S. HAMMETT

Studies on narcosis. HERMANN LANGE AND B. W. MULLER. *Klin. Wochschr.* I, 23(1922).—An excized, surviving muscle excretes  $H_3PO_4$  into the surrounding medium. Any condition that increases the permeability of the muscle cells increases the excretion of  $H_3PO_4$  and vice-versa. By using this method the authors have studied the effect of narcotics on the permeability of muscle cells. Narcotics in small concns. decrease the cell permeability; in large concns. they increase the cell permeability. Removal of the narcotic rapidly leads to a reinstatement of the normal condition of permeability. Conclusion: Cell permeability, increased or decreased, cannot be a causative agent in narcosis. MILTON HANKE

Complete recovery of a case of severe acute benzene poisoning after an intravenous injection of lecithin emulsion. NICK. *Klin. Wochschr.* I, 68-9(1922).—A man, age 37, who had swallowed about 80 g. of com. benzene was given 5 cc. of a 10% lecithin emulsion (Merck) intravenously, about 2 hrs. after taking the poison. There were signs of improvement within an hour. Thirty-six hours after the lecithin injection, all outward signs of poisoning had disappeared except for a trace of protein in the urine. The paper contains a detailed description of this case, a good description of the syndrome of benzene poisoning in general, and comparative evidence to show that the usual lethal dose of benzene is far below 80 g. N. believes that this case would have terminated fatally but for the lecithin injection. MILTON HANKE

The effect of adrenaline on the permeability of the muscle fiber cell membrane. HERMANN LANGE. *Klin. Wochschr.* I, 70(1922).—An adrenaline treated frog muscle has been shown to excrete  $H_3PO_4$  less rapidly into the surrounding medium than an untreated muscle. An adrenaline treated frog muscle that is suspended in a soln. of a K

salt becomes paralyzed far less rapidly than a similarly suspended, untreated muscle. Conclusion: Adrenaline reduces the permeability of the muscle cell wall to  $H_2PO_4$  and K ion and hence, probably, to many other substances. The beneficial action of adrenaline in cases of bronchial asthma may be associated with this tendency to reduce cell permeability.

MILTON HANKE

**The blood sugar picture in children following the intravenous injection of a concentrated glucose solution.** HANS OPITZ. *Klin. Wochschr.* 1, 117-8(1922).—Intravenous injections of 50% glucose solns. (1.786 g. glucose per kg. body wt.) were administered to 5 children varying in age from 6 to 12 and suffering from a variety of ailments. Blood sugar exams. by Bang's micromethod were made at short intervals over a 10-hr. period following the injection. The blood sugar value rises rapidly to 0.32-0.58% in the course of 15 min., then drops more slowly so that a normal value is not obtained again until about one hour after the injection. After that the curve exhibits an unusual irregularity over the 10-hr. investigation period. The concn. of the sugar soln. and the rate of injection do not seem to influence the blood sugar picture markedly. The abs. quantity injected per kg. body wt. is the important factor. Only a very small part of the injected glucose appears in the urine even after the use of very concd. sugar solns. A copious excretion of concd. urine follows the injection. The subject becomes flushed, shows a marked rise in body temperature (up to  $40.6^\circ$ ) with severe chills and suffers with a headache.

MILTON HANKE

**Carbon monoxide poisoning.** ALICE HAMILTON. *Bull. U. S. Bur. Labor Statistics* No. 291, 1-47(1921).—Sections are devoted to the acute and chronic types of CO poisoning, other constituents of industrial gases, and the industries in which CO poisoning may occur. Acute CO poisoning occurs in the United States in the manuf. of steel, illuminating gas, and coke, mining of coal and metals, industries using producer gas, smelting of Zn, and garages. The mortality from this cause in the steel industry is given as 4.8%. None of the 30 cases, which occurred in the gas industry during 1919, were fatal. Serious after effects are extremely rare in the cases which occur in the mining of coal and metals and the manuf. of steel. Chronic CO poisoning may occur in industries in which small amts. of CO are more or less continuously present in the atm. Examn. was made of the blood of 55 garage employees and 47 linotypists; demonstrable amts. of CO were present in the blood of 36 of the garage men and of 8 of the linotypists.

JOSEPH S. HEPBURN

**Heloderma: notes upon its effects and the explanation of the action of some of the snake venoms.** LINN J. BOYD. *J. Am. Inst. Homeopathy* 14, 803-10(1922).—A review of the physiol. action of the venom of the Gila monster and of the following snakes: *Lachesis*, *Daboia*, *Naja*, *Crotalus*, *Vipera berus*, and *Bungarus caeruleus*.

JOSEPH S. HEPBURN

**Plumbum metallicum: a review of some of its symptomatology.** L. J. BOYD. *J. Am. Inst. Homeopathy* 14, 1001-9(1922).—Review, with bibliography, of the action of Pb on the various organs and tissues of the body.

JOSEPH S. HEPBURN

**Effect of aurum metallicum upon the constituents of the blood.** A. E. HINSDALE, R. W. HOFFMAN, A. L. BROWN AND S. N. LORD. *J. Am. Inst. Homeopathy* 14, 1129-30(1922).—A 0.5% aq. soln. of  $AuCl_3$  was administered to rabbits hypodermically; each animal received 45 cc. of the soln. during a period of 3 weeks. The uric acid content of the blood remained unchanged; its dextrose content decreased; its total solids, total P, chlorides, Ca, Fe, urea, creatinine, and N increased.

JOSEPH S. HEPBURN

**Physiological principles governing ventilation when the air is contaminated with carbon monoxide.** YANDELL HENDERSON AND HOWARD W. HAGGARD. *J. Ind. Eng. Chem.* 14, 229-36(1922).—The following standards have been derived for periods of a few hrs. The time in hrs. is multiplied by the concn. of CO in parts per 10,000 of air.



When the product equals 3, no perceptible physiol. effect occurs; when it equals 6, physiol. effect is just perceptible. When it equals 9, headache and nausea are produced. When it equals or exceeds 15, conditions dangerous to life exist. The rate of absorption of CO is proportionally increased, if the vol. of breathing be increased by exercise. After return to fresh air, elimination of CO through the lungs occurs at a rate of 30 to 60% reduction of the blood satn. per hr. CO is the only important toxic constituent of the exhaust gas from gasoline; accessory toxic compds. are present in illuminating gas and in the exhaust gas from coal distillate.

JOSEPH S. HEFBURN

**Chronic manganese poisoning: two cases.** G. G. DAVIS AND W. B. HUEY. *J. Ind. Hyg.* 3, 231-8(1921).—A full description is given of the symptoms of chronic Mn poisoning which occurred in 2 workmen employed at an elec. furnace used in melting ferromanganese in a steel plant. Mn apparently makes a very definite attack upon some non-vital portion of the neuromuscular system, destroys it thoroughly if time for action is permitted, and leaves the victim quite well in every other respect. J. S. H.

**Lead poisoning in industry.** KENNETH GOADBY. *J. State Med.* 30, 93-112(1922).—A lecture. Sections are devoted to statistics of industrial Pb poisoning, its causes, pathology, symptoms (including paralysis, encephalopathy, and rheumatic symptoms), and prevention.

JOSEPH S. HEFBURN

**Physiological effects of exposure to low concentrations of carbon monoxide.** R. R. SAVERS, F. V. MERIWETHER AND W. P. YANT. *Reports Investigations Bur. of Mines*, No. 2338, 1-6(1922).—Subjects were exposed to air contg. CO in concns. ranging from 2 to 4 parts per 10,000 for periods as long as 6 hrs. When the subject remained at rest, combination of CO with the hemoglobin occurred slowly, and many hrs. were required to attain an equil.; the combination occurred more rapidly during the first hr. of exposure than during any succeeding hr. Strenuous exercise greatly increased the velocity with which the CO and the hemoglobin combined, and also rendered more marked the symptoms of CO poisoning. With a given concn. of CO, the combination of CO and hemoglobin occurred more rapidly at a high temp. and humidity than under normal conditions of temp. and humidity. All symptoms and effects produced were acute in character; and none of the subjects suffered any permanent deleterious effects from the exposure to CO. Also in *U. S. Public Health Reports* 37, 1127-42(1922).

JOSEPH S. HEFBURN

**Use of drugs in oil intravenously.** H. R. MILLER. *Trans. Coll. Physicians Philadelphia* [3] 42, 25-7(1920).—Injection of sterile olive oil into the blood stream of a rabbit practically always produces death by embolization. In dogs, intravenous administration of adrenaline in oil (e. g., 0.1 mg. in 0.3 mil. of oil) produces a gradual, and usually, an even rise in blood pressure followed by a rather uniform, prolonged, gradual, descent to the normal level. A lethal dose of cryst. stropanthin (i. e., 0.12 mg. per kg. of body wt.), dissolved in oil and administered to a dog intravenously, produces a slow, gradual and pronounced effect lasting for several hrs.; death does not occur. By the use of oil as a solvent, a prolonged drug effect is obtained without the initial abrupt phenomena.

JOSEPH S. HEFBURN

**Some newer concepts in digitalis therapy.** CARY EGGLESTON. *Trans. Coll. Physicians Philadelphia* [3] 42, 30-51(1920).—Review of recent work on the physiol. action of digitalis.

JOSEPH S. HEFBURN

**Horatio C. Wood, the pioneer in American pharmacology.** HOBART A. HARR. *Trans. Coll. Physicians Philadelphia* [3] 42, 170-4(1920).—Memorial address.

JOSEPH S. HEFBURN

**Action of potassium, calcium, and magnesium ions on the sympathetic nerve of the heart.** J. TEN CATZ. *Arch. Néerland. Physiol.* 6, 269-88(1921).—Frogs' hearts perfused with Ringer solution contg. Mg or excess of K or Ca, or from which K is omitted,

respond to excitation of the accelerator nerve or to the action of adrenaline after they have ceased to beat. The same holds if the Ringer soln. is replaced by an isotonic soln. of common salt, but there is no response when Ca-free Ringer is used. The possible explanation is discussed.

J. C. S.

**Reminiscences of an American pioneer in experimental medicine.** HORATIO C. WOOD. *Trans. Coll. Physicians Philadelphia* [3] 42, 195-234 (1920).—Autobiography published posthumously. W's contributions to pharmacology and exptl. therapeutics are described.

JOSEPH S. HEPBURN

**The calcium-potassium action.** K. SPIRO. *Schweiz. med. Wochschr.* 51, 457-60. —Examples are given of the antagonistic physiol. action of Ca and K. With isolated frogs' hearts, poisoning by K salts was neutralized by Ca salts. The effect of certain alkaloids may be influenced by the relative amts. of Ca and K present. Changes in the reaction of the medium influence the Ca-K action.

J. C. S.

**The treatment of typhoid suppuration with dyes.** KURT WOHLGEMUTH. *Berl. klin. Wochschr.* 58, 1128 (1921).—Fuchsin was successfully used in treating a case of typhoid osteitis.

JULIAN H. LEWIS

**Observations on the toxicity of tetranitromethylaniline (tetryl), tetranitroxylene (T. N. X.), tetranitroaniline (T. N. A.) dinitrodichlorobenzene (parazole), and *m*-nitroaniline (M. N. A.).** H. GIDEON WELLS, *et al.* *J. Ind. Hyg.* 2, 247-52 (1920).—Tetryl, T. N. X., and M. N. A. have marked effects on the kidney. Tetryl produces agglutinative thrombi and M. N. A. a marked secondary anemia. Parazole and T. N. A. produce local reactions (dermatitis and subcutaneous inflammation). The best protection found against the local action of parazole was 2 layers of a water-proof cloth covering a layer of a mixt. of acacia, glycerol and glue.

JULIAN H. LEWIS

**The effect of saline purgatives on the absorption and excretion of phenolsulfonephthalein. A preliminary communication.** DAVID I. MACHT. *J. Urol.* 7, 271-83 (1922).—The excretion of phenolsulfonephthalein (A) by the kidneys after its administration through the stomach tube in animals is delayed by the previous administration of saline purgatives in the same animal. The administration of saline purgatives through the stomach tube in animals produces also a delay in the excretion of A even after injections of that drug. The above observations on animals have been confirmed also on a few human subjects and therefore invite a more extensive clinical investigation concerning the influence of saline purgatives on the excretion of A.

J. H. L.

**The toxicity of potassium chloride in experimental nephritis.** F. P. UNDERHILL AND ROY C. FERGUSON. *J. Urol.* 7, 311-9 (1922).—KCl intravenously administered to rabbits with tartrate nephritis is much more toxic than NaCl introduced under similar exptl. conditions. KCl intravenously injected is no more toxic to rabbits with tartrate nephritis than it is to normal animals. The induction of a nephritic condition in a rabbit by tartrate, therefore, does not render the animal more susceptible to KCl introduced directly into the blood stream.

JULIAN H. LEWIS

**Saligenin as a local anesthetic for cystoscopy in men.** ARTHUR D. HIRSCHFELDER, A. J. WETHALL and GILBERT J. THOMAS. *J. Urol.* 7, 329-31 (1922).—In 10 cases in which 4% solns. of saligenin (*C. A.* 15, 274) were instilled into the male urethra anesthesia satisfactory for cystoscopy was obtained, as was likewise the case in 20 cases in which 8% solns. were used. No unpleasant results were experienced in these cases. Saligenin is a local anesthetic of very low toxicity and is slightly antiseptic.

J. H. L.

**Physiological and pharmacological studies of the prostate gland. IV. Response of prostatic muscle to drugs.** D. I. MACHT. *J. Urol.* 7, 407-15 (1922).—The effects of various drugs were studied on strips of surviving excized prostate gland of different animals. The preps. responded promptly with contraction to BaCl<sub>2</sub> and with relaxation to papaverine-HCl, thus indicating the presence of muscle tissue. The preps.

responded distinctly to treatment with epinephrine and ergotoxin but failed to respond (with the exception of the rabbit prostate) to treatment with pilocarpine, physostigmine, muscarine and atropine. These observations speak in favor of a true sympathetic innervation of the prostate gland.

JULIAN H. LEWIS

**The toxic action of parazole (crude dichlorodinitrobenzene).** CARL VORGLIN, A. E. LIVINGSTON AND C. W. HOOPER. U. S. Public Health Service, *Hyg. Lab. Bull.* 126, 183-211(1920).—Parazole consists principally of a mixt. of 3 isomers of dichlorodinitrobenzene. It produces a severe dermatitis and conjunctivitis. The production of skin lesions is governed to some extent by the condition of the skin at the time of the application of the substance. If the epidermis is intact the lesions are less severe than when the skin is slightly injured by shaving. The 3 isomers of dichlorodinitrobenzene in chemically pure form were found to exert the same injurious effects on the skin, although somewhat less pronounced than that of the crude product. The systemic effect of parazol consists principally in the production of a secondary anemia very similar in character to that produced by trinitrotoluene. To prevent the dermatitis and conjunctivitis, clean working conditions, substitution of machinery for manual labor, and prevention of air contamination are probably the most effective means. Expts. made with various skin varnishes proved them to be unreliable as a protective measure. J. H. L.

**Mercury fulminate as a skin irritant.** A. E. LIVINGSTON. U. S. Pub. Health Service, *Hyg. Lab. Bull.* 126, 203-11(1920).—A review of the literature discloses that  $\text{Hg}(\text{CNO})_2$  causes a very severe dermatitis in workers who handle it. Experimentally it is shown that as much as 50 mg. applied to the skin of rabbits and dogs for 2 or 3 hrs. or more produces a marked local inflammation. In man, however, it was impossible to produce the slightest effect by applying 10 mg. to the skin for 24 hrs. or longer. In rabbits there is no systemic effect of  $\text{Hg}(\text{CNO})_2$  absorbed through the skin. When the skin is covered with a thin coat of shellac it is protected from the action of  $\text{Hg}(\text{CNO})_2$ .  $\text{Na}_2\text{S}_2\text{O}_3$  which readily dissolves  $\text{Hg}(\text{CNO})_2$  is of no value as a treatment after injury has been produced but may prove of benefit as a wash for completely removing the fulminate crystals which are practically insol. in  $\text{H}_2\text{O}$ .

JULIAN H. LEWIS

**The role of hexamethylenetetramine in the production of hematuria.** W. A. BLOEDORN AND J. E. HOUGHTON. *J. Lab. Clin. Med.* 7, 514-33(1922).—Following the administration of  $(\text{CH}_2)_6\text{N}_4$  in even moderate dosage a small % of individuals will develop hematuria. These cases show a high H-ion concn. of the urine. It is considered that these individuals possess an idiosyncrasy to  $(\text{CH}_2)_6\text{N}_4$ . This idiosyncrasy can be demonstrated by a cutaneous reaction test, with the drug itself as the antigen. A high H-ion concn. favors the elimination of  $\text{HCHO}$  in the urine and appears to be a necessary factor in the production of hematuria. A high H-ion concn. of the urine is of itself not sufficient to cause a hematuria following the administration of  $(\text{CH}_2)_6\text{N}_4$ . The hematuria is vesical in origin. Attempts to produce hematuria in unsusceptible individuals by the administration of  $(\text{CH}_2)_6\text{N}_4$  were unsuccessful even when the  $p_{\text{H}}$  of the urine was kept low by the administration of  $\text{Na}_2\text{HPO}_4$ . The administration of  $\text{NaHCO}_3$  in doses of 10 g. daily in connection with  $(\text{CH}_2)_6\text{N}_4$  will prevent the liberation of  $\text{HCHO}$  in most instances. When the urine is sufficiently acid a positive test for  $\text{HCHO}$  can be obtained in from 20 mins. to 3 hrs. following the administration of 3 g. of  $(\text{CH}_2)_6\text{N}_4$ . When the  $p_{\text{H}}$  of the urine is much above 6 the liberation of  $\text{HCHO}$  is interfered with. A  $p_{\text{H}}$  as low as 6 is impossible in any other medium in the body except the urine and gastric juice, and if  $(\text{CH}_2)_6\text{N}_4$  is dependent on the liberation of  $\text{HCHO}$  for its antiseptic properties these properties can never be manifested except in the genitourinary tract.  $(\text{CH}_2)_6\text{N}_4$  is toxic for guinea pigs and produces extensive inflammatory reactions in the genitourinary and gastrointestinal tracts. The hematuria in guinea pigs is chiefly renal in origin.

E. R. LONG

**The action of  $\beta$ -rays of radium on excitability and conduction in the nerve trunk.** E. S. REDFIELD, A. C. REDFIELD AND A. FORBES. *Am. J. Physiol.* 59, 203-31(1922).—Intense radiation with  $\beta$ -rays destroys the functional capacity of a nerve trunk. To produce an appreciable change the radiation must be much more intense than is required to produce marked disturbances in dividing cells or ova. Microscopic examn. of the nerve with lost function reveals fatty degeneration of the myelin sheath.

J. F. LYMAN

**The effect upon the cold-blooded heart of changes in the ionic content of the per-fusate. I. Upon the normal mechanism. II. Upon the arrhythmias.** E. C. ANDRUS AND E. P. CARTER. *Am. J. Physiol.* 59, 227-39(1922).—Solus. of various ions were perfused through beating turtle heart while work records and electrocardiograms were simultaneously obtained.

J. F. LYMAN

**The effect of some polyhydric alcohols on the behavior of rats in the circular maze.** D. I. MACHT AND GIU CHING TING. *Am. J. Physiol.* 60, 496-9(1922).—The narcotic effect of intraperitoneal injection of various alcs. was detd. by noting the reaction of white rats, trained to enter a labyrinthian maze. The smallest amt. of the various alcs. which produced a depression in the behavior of the rats was as follows, per 100 g. of rat: EtOH 80 mg., glycol 120 mg., glycerol 160 mg., erythritol 290 mg., arabitol 230 mg., mannitol 320 mg., dulcitol 120 mg., perseitol over 380 mg., volemitol over 380 mg. All the polyhydric alcs. tried when administered in sufficient quantity produced a depressant effect.

J. F. LYMAN

**Action of dimethyltellurionium dihalides.** D. V. COW AND W. R. DIXON. *J. Physiol.* 56, 42-52(1922).—The physiol action of the two isomeric dimethyltellurionium dichlorides ( $\text{Me}_2\text{TeCl}_2$ ) prepd. by Vernon (C. A. 14, 2018) was detd. The  $\alpha$ -halide, arranged in the *trans* position, is relatively inactive. The  $\beta$ -halides arranged in the *cis* position, acts as a powerful medullary stimulant and specifically excites the suprarenal glands. Large doses paralyze nerve structures in the following order: (a) sympathetic ganglion cells, (b) other autonomic ganglion cells, (c) medulla and motor nerve endings. The suprarenal gland can manuf. almost unlimited amts. of adrenaline. The physiol. activity of the  $\beta$ -halide is believed to be due to some energy factor which holds the constituents of the mol. in an abnormal and strained position.

J. F. LYMAN

**Salt and water elimination in man.** M. M. BAIRD AND J. B. S. HALDANE. *J. Physiol.* 56, 259-62(1922).—The excretion of salts and water after the ingestion of hypertonic solns. followed by copious water drinking shows that the diuresis produced is independent, within wide limits, of the amt. of water ingested. Salts are less mobile in the body than water. Excess salts are stored probably in the skin and connective tissues, in which the circulation of blood is slow.

J. F. LYMAN

**The relationship of the increase in blood sugar concentration to the specific dynamic action of glucose and to the specific dynamic action of adrenaline.** W. M. BOOTHBY AND I. SANDIFORD. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 293-4(1921).—There is from the ingestion of dextrose an increase in heat production of 9% for an increase in blood sugar of 101%. There is an increase in heat production of 20% as a result of the injection of adrenaline with an increase of only 37% in the blood sugar. B. and S. consider that adrenaline has a sp. dynamic effect on all the cells of the body causing them to metabolize more rapidly under its influence.

J. F. LYMAN

**The diuretic action of pituitrin.** O. O. STOLAND AND J. H. KORB. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 305-6(1921).—Pituitrin injection into dogs seems to act as a stimulant to the kidney in that it produces such a marked secretion of urine that the N content of the blood falls far below normal.

J. F. LYMAN

**The intestinal mechanism primarily stimulated by sodium carbonate.** F. S. HAMMETT. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 309(1921).—Expts. indicate that

the extrinsic nerve fibers or endings in the isolated intestinal segment are the mechanism of the intestine that is primarily stimulated by  $\text{Na}_2\text{CO}_3$ , resulting in the shortening that is commonly obtained.

J. F. LYMAN

**A quantitative study on the effects of magnesium chloride on nerve.** E. GREIS-HEIMER AND C. E. SHEPARD. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 319-21 (1921).—The effects of  $\text{MgCl}_2$  on the conductivity of the sciatic nerve of the frog is not strikingly different from the action of other salts as  $\text{KCl}$ ,  $\text{RbCl}$  and  $\text{CaCl}_2$ .

J. F. LYMAN

**A new factor in drug analgesia.** H. G. BARBOUR AND D. S. LEWIS. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 445 (1922).—Acetylsalicylic acid gave relief in certain types of headache, the relief being accompanied by diln. of the blood. The hemodilution of drug analgesia is not a hyperdilution but is probably rather a return to normal from a condition of over concn.

J. F. LYMAN

**Water intoxication.** L. G. ROWNTREE. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 451-2 (1922).—Excessive intake of  $\text{H}_2\text{O}$  subsequent to the subcutaneous injection of pituitary ext. may cause symptoms of intoxication even ending in death. There seems to be considerable increased intracranial pressure which, in some cases, can be relieved by the intravenous injection of hypertonic saline. It is likely that pituitrin acts through lessening the amt. of  $\text{H}_2\text{O}$  excreted and water is responsible for the symptoms.

J. F. L.

**Smooth muscle responses when subjected to alcohols.** F. M. BALDWIN AND B. M. HARRISON. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 453-4 (1922).—The action of  $\text{EtOH}$  and  $\text{PrOH}$  on excized smooth muscle (intestine) of the frog and turtle and body muscles of the earthworm was studied.

J. F. LYMAN

**Calorigenic effect of adrenaline in dogs.** W. M. BOOTHBY AND I. SANDIFORD. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 463-4 (1922).—The subcutaneous or intramuscular injection of adrenaline in amts. not far from physiol (0.0016 to 0.0032 mg. per kg. per min.) produced a perceptible increase in heat production in dogs. The data support Cannon's hypothesis of the "emergency action" of the adrenals.

J. F. L.

**The relative alcohol content of blood and urine.** W. R. MILLS. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 59, 477-8 (1922).—Comparison of the alc. content of simultaneous samples of urine and blood after the ingestion of  $\text{EtOH}$  shows that in the elimination of alc. by the kidney the usual action of concn. by the kidney is followed.

J. F. LYMAN

**The antagonism between histamine and adrenaline.** C. H. KELLAWAY AND S. J. COWELL. *Proc. Physiol. Soc., J. Physiol.* 56, xx (1922).

J. F. LYMAN

**Radioactivity and smooth muscle.** E. SORER. *Proc. Physiol. Soc., J. Physiol.* 54, lxxxiii (1921).—The radioactive ions U, Th, Rb and Cs, also free radiations are effective in stimulating the isolated guinea-pig uterus, thus having the same effect as K salts.

J. F. L.

**The alleged hypersusceptibility of the rat to squill.** J. A. GUNN AND R. ST. A. HРАТСОН. *Proc. Physiol. Soc., J. Physiol.* 54, lxxxv (1921).—The common statement that the rat is more sensitive to the toxic action of squill than other lab. animals does not appear to be true. G. and H. found that glucoside of squill resembles the other glucosides of the digitalis group in its toxic effects. The rat is markedly less susceptible than the rabbit.

J. F. LYMAN

**Antagonisms and reinforcements.** W. BURRIDGE. *Proc. Physiol. Soc., J. Physiol.* 54, xc (1921).—It is shown that an ion may have (1) a direct antagonistic effect on the action of Ca on the heart and also (2) an indirect reinforcement effect.

J. F. LYMAN

**Caffeine glucosuria. Sympathetic system and caffeine glucosuria.** E. BARDIER, P. DUCHERIN AND A. STILLMUNKES. *Compt. rend. soc. biol.* 86, 4-8 (1922).—Glucosuria is very difficult to produce by injections of caffeine into normal animals, and is inconsistent even with large doses in animals which have previously received a carbohydrate-rich diet. Caffeine (0.08 cg. per kg.) injected into a dog abolishes the blood pressure rise

produced by splanchnic stimulation. Nevertheless the splanchnics must be intact to enable the caffeine to produce glucosuria. It is concluded that caffeine produces glucosuria by a powerful central stimulation conducted peripherally by the splanchnics, these nerves, however, under the influence of caffeine, are in a condition of greatly depressed excitability.

S. MORGULIS

An experimental study on the action of sparteine on the circulation. E. DUVILLIER, P. COMBEMALE AND H. BULTEAU. *Compt. rend. soc. biol.* 86, 41-2(1922).—In dogs under artificial respiration an injection of sparteine produces complete paralysis of the vagus nerve. Even when the animal is previously atropinized there occurs a general fall in blood pressure owing to the slowing of the heart action. This action of sparteine on the heart manifests itself also in a diminished vol. of the kidney and in the lowering of the intraventricular pressure.

S. MORGULIS

Cardiovascular effect of eserine on normal man. D. DANIELOPOLU AND A. CARNIOL. *Compt. rend. soc. biol.* 86, 86-7(1922).—This substance has been tested on patients and has been found to exert at first a transitory accelerating influence followed afterwards by the usual vagus-like effect.

S. MORGULIS

The toxicity of  $\beta$ -benzylglucoside obtained by biochemical synthesis. A. RICHAUD. *Compt. rend. soc. biol.* 86, 649-51(1922).—R. attempted to overcome the relative toxicity of benzyl benzoate introduced by Macht as an antispasmodic by substituting for it  $\beta$ -benzylglucoside,  $\text{PhCH}_2\text{OCH}(\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}_2\text{OH})$ . This has the

advantage over benzyl benzoate in that it is more sol. in  $\text{H}_2\text{O}$  and is less irritating to the tissues. Administered subcutaneously the toxic dose for the mouse or guinea-pig is 11-12 g. per kg. For the rabbit the toxic intravenous dose is 8-9 g. per kg. S. M.

The action of the digestive juices on  $\beta$ -benzyl-d-glucoside. A. RICHAUD. *Compt. rend. soc. biol.* 86, 770-2(1922).—R. incubated the macerated mucous membrane of the dog with  $\beta$ -benzyl-d-glucoside in the presence of two preservatives (toluene and NaF) but could not find any measurable trace of sugar split off even after 36 hrs. He, therefore, concludes that the substance is not attacked by the emulsin of the intestinal tract and is absorbed into the circulation unchanged.

S. MORGULIS

The effect of arsenic upon growth and upon the development of bones. A. VAN DEN BECKHOUT. *Arch. int. pharmacodynamie* 26, 197-213(1922).—Arsenic administered to rabbits in daily doses of 1-2 mg. over a period of 10-30 days had no effect upon the growth or wt., but did produce heavier, denser and stronger bones than were obtained in the control animals.

W. A. PERLZWEIG

Pharmacological examination of isopropyl alcohol. D. I. MACHT. *Arch. int. pharmacodynamie* 26, 285-6(1922); cf. *C. A.* 15, 122.—Iso-PrOH is more toxic than EtOH and MeOH, and less toxic than normal PrOH. Administration by mouth produces narcotic effects, in larger doses general anesthesia, and finally coma and death. Very little of the drug is absorbed by inhalation and very little evidence has been found of its absorption through the skin. The drug has been used to produce general anesthesia in cats by the author. While the drug is poisonous to the isolated heart muscle it is not very toxic to the heart and circulation in general in the intact animal unless given in very large doses. Death after fatal doses is due to paralysis of the respiratory center, but when administered in smaller quantities for general anesthesia the respiratory center is not excessively depressed.

W. A. PERLZWEIG

Toxicology and pharmacology of the flowers of *Sophora japonica*. ALBERTO GARBILLO. *Arch. int. pharmacodynamie* 26, 317-27(1922).—The flowers of *Sophora japonica* contain an alkaloid which gives different reactions from those given by cytosine which is present in the grains of this plant. The flowers also contain a glucoside different in nature from the previously isolated rutin (or sophorin). The new glucoside is toxic;

2-5 mg. is lethal to rats and frogs which die from progressive paralysis. It slows the heart and stops it in systole; it lowers temporarily the blood pressure. It has no effect on muscle contractility or on nerve conductivity.

W. A. PERLZWEIG

**The dilating effect of quinine upon blood vessels.** R. LATZEL. *Wiener klin. Wochschr.* 34, 21-2(1921).—Administration of quinine by mouth or intravenously to several cases appeared to relieve undesirable symptoms of vasoconstriction. W. A. P.

**"Cehasol" in dermatology.** HERBERT PLANNER. *Wiener klin. Wochschr.* 34, 47-8(1921).—"Cehasol" is a dark brown, viscous substance. It is obtained by fractional distn. of oil shale. The sulfonic acids arising from the treatment of the distillate with  $H_2SO_4$  are neutralized with  $NH_4OH$ . Through modification of this process (not given) the original  $H_2O$ -insol. substance (*ichthyofossil*) was obtained in sol. form. The application of the substance in acute and subacute inflammatory conditions of the skin is claimed to have yielded beneficial results, which are ascribed to its properties as a vasoconstrictor and its effects in limiting local secretory processes. The substance is non-irritant and is easily tolerated.

W. A. PERLZWEIG

**Intravenous therapy and the action of intravenously administered hypertonic solutions.** KARL STEJSKAL. *Wiener klin. Wochschr.* 34, 34, 59-60, 146-7, 200-1, 343-4(1921).—Exptl. proof and details of the author's theory that intravenous injections of hypertonic solutions cause an increased flow of tissue fluids into the blood. The use of hypertonic injections is advocated for such cases as edema of the lungs, local inflammations and also for increasing the absorption from the blood of medicaments administered about 20 hrs. after the injection of sugar soln.

W. A. PERLZWEIG

**The influence of intravenous sugar injections upon narcosis.** ALFRED EXNER. *Wiener klin. Wochschr.* 34, 35, 60(1921).—Application of Stejskal's work (cf. preceding abstr.) to surgical technic. Intravenous injection of about 40 cc. of 25% sugar soln. 10-12 hrs. before operation lessened the excitement of the patients in the first stages of ether narcosis and also the unpleasant after effects.

W. A. PERLZWEIG

**Treatment of exudative disorders of the eye by means of intravenous sugar injections.** HANS LAUBER. *Wiener klin. Wochschr.* 34, 35-6(1921); cf. 2 preceding abstracts.—Favorable results are reported.

W. A. PERLZWEIG

**Application of intravenous injections of hypertonic glucose solutions in dermatology and syphilis.** VIKTOR PRANTER. *Wiener klin. Wochschr.* 34, 36(1921); cf. preceding abstracts.—Few and indefinite results are quoted following the use of intravenous injections of glucose preceding medication.

W. A. PERLZWEIG

**Intravenous therapy and the action of intravenous injections of hypertonic solutions.** GUSTAV SINGER. *Wiener klin. Wochschr.* 34, 86-7(1921).—S. claims priority over Stejskal in the application of intravenous injections of hypertonic solutions. W. A. P.

**The action of intravenous injections of glucose and gum arabic solution upon diuresis.** KARL CORI. *Wiener klin. Wochschr.* 34, 169-71(1921).—Hypertonic glucose soln. administered intravenously has a strong diuretic effect on dogs, similar to molar diuresis. Abundant excretion of  $Cl^-$  results, accompanied by a correspondingly large quantity of  $H_2O$ . On diets contg. only a small amt. of  $Cl$  less  $Cl$  is excreted and diuresis is also diminished. After 24 hrs. the increased flow of  $Cl$  into the blood from the tissues can still be observed. The absorption and excretion of nitrates administered by mouth were accelerated by the effect of glucose, as shown by Stejskal. In man glucose soln. has no diuretic effect, as the  $Cl$  adheres more closely to the tissues. 7% gum arabic soln. injected intravenously reduces the sugar excretion of the diabetic. Simultaneously the amt. of urine decreases. In dogs gum arabic soln. causes a diminished excretion of ingested  $I$  as compared with control animals. The gum soln. proves of weak diuretic effect in expts. on dogs and there is no increased excretion of  $Cl$ . It is, therefore, a question of  $H_2O$  diuresis as opposed to glucose diuresis. (Cf. C. A. 14, 222.) W. A. P.

**New methods in syphilis therapy. I. Pharmacological studies with a new iodine compound.** ALFRED FROHLICH. *Wiener klin. Wochschr.* 34, 105-6(1921).—The substance used is a com. prepn., "Mirion," consisting of an I-contg. nucleus introduced into a colloid complex. The exact constitution is not given. The prepn. is a yellow transparent fluid with a slight odor of I, of very weak acid reaction and contg. only 1.7% I. None of the I is free. The I is easily liberated by weak oxidizing agents such as  $H_2O_2$ . This property of the easy liberation of active I, which then reacts with protoplasmic material, is held to be responsible for the pharmacol. reactivity of the substance. In distinction from inorg. I compds. this substance yields its I quant. and rapidly in the body under the mild oxidative processes of the cells and tissues. The prepn. is entirely non-toxic even in large doses. The absorption is rapid, as is the elimination of I in urine and stools of animals. At autopsy I was found to be retained only in the walls of the gastrointestinal canal. When the substance was injected into syphilitic patients and infected animals there was a marked sp. retention of I in the affected tissues.

W. A. PERLZWEIG

**Clinical experiences with Benkoe's iodine preparation.** J. KYRLE and H. PLANNER. *Wiener klin. Wochschr.* 34, 106-8(1921); cf. preceding abstr.—Promising results are reported.

W. A. PERLZWEIG

**Colloid therapy.** FRIEDERICH LUTHLEN. *Wiener klin. Wochschr.* 34, 119-20 (1921).—An attempt is made to unify the resp. mechanisms and therapeutic effects of such processes as: bleeding, parenteral administration of serum, plasma, blood, vaccines, foreign proteins, colloidal metals, etc., under the term of colloid therapy. W. A. P.

**The action of papaverine upon blood pressures raised by adrenaline in man.** KARL CSEFAL. *Wiener klin. Wochschr.* 34, 182(1921).—No definite raising or lowering effect of papaverine upon blood pressures previously raised by adrenaline was found.

W. A. PERLZWEIG

**Arsphenamine therapy in pulmonary gangrene.** BELA MOLNAR, JUN. *Wiener klin. Wochschr.* 34, 255(1921).—Favorable results are reported in 2 cases. W. A. P.

**The local action of dimethyl sulfate.** JOSEPH BODENSTEIN. *Wiener klin. Wochschr.* 34, 226-7(1921).—Report of a case of poisoning with  $Me_2SO_4$ . The mode of action resembles closely that of  $H_2SO_4$ .

W. A. PERLZWEIG

**Acute dermatitis caused by fumes of phenol, formaldehyde and ammonia in the manufacture of artificial amber.** OTTO SACHS. *Wiener klin. Wochschr.* 34, 356(1921).—The manuf. of artificial amber (bakelite is specified) was recently introduced in Austria. S. calls attention to increasing numbers of cases of dermatitis directly due to exposure to the fumes of  $PhOH$ ,  $CH_2O$  and  $NH_3$  in the plants. He describes suitable therapeutic measures and urges proper protection for the workers.

W. A. PERLZWEIG

**Pharmacological tests of the vegetative nervous system.** STEFFEN RUSZNYAK. *Wiener klin. Wochschr.* 34, 591-2(1921).—*Pilocarpine* hypersensitiveness does not signify "vagotonia" and *adrenaline* hypersensitiveness does not signify "sympathicotonia." *Pilocarpine* and *adrenaline* hypersensitiveness are not mutually exclusive, and often affect only individual organs or tissues. The conceptions of "vagotonia" and "sympathicotonia" in their original forms must be discarded. Since exact functional diagnostic methods of the vegetative nervous system are at present impossible by means of pharmacol. investigations, these conceptions must be limited to individual organs and not to the entire vegetative nervous system.

W. A. PERLZWEIG

**Preventive and curative action in syphilis of the sodium salt of the acetyl derivative of hydroxyaminophenylarsenic acid.** C. LEVADITI and A. N. MARTIN. *Compt. rend.* 174, 893-5(1922); cf. Sazerac and Levaditi, *C. A.* 16, 1990.—The salt mentioned above is designated "190." Expts. with rabbits and a monkey showed that 190 in doses of 10 to 20 cc. of a 10% soln. by mouth promoted the rapid and final healing of syphilitic



lesions in both animals. Administered before inoculation to a man and to *Macacus cynomolgus* the drug prevented infection. L. W. RIGGS

Nicotine and the inhibitory nerves of the heart. W. KOSKOWSKI. *Compt. rend.* 174, 1039-41 (1922).—Expts. were made with a dog by cutting eleven days apart, the branches of the pneumogastric in the neck, and 17 days after the 2nd operation there was injected into the femoral vein 2 cc. of a 1% soln. of nicotine tartrate and the pulse and blood pressure were recorded. Notwithstanding the degeneration of the pneumogastric the intracardiac ganglia retained their power of action. Apparently nicotine does not act on the heart by the intermediary of the pneumogastric but directly upon the intracardiac ganglia. L. W. RIGGS

Lead poisoning. F. HEIM, E. AGASSE-LAFONT AND A. FEIL. *Bull. Médical* 36, 223 (1922); *J. Am. Med. Assoc.* 78, 1424.—The number of leucocytes is usually normal, but about 40% may be mononuclear in the early stages of Pb poisoning. The erythrocyte figure is also normal in the presaturnism phase. Persons once satd. with Pb show pronounced anemia, which is very slow in receding even when there is no further contact with Pb. The presence of basophilic granules in the erythrocytes is the earliest and most const. sign of injury from Pb. Basophilic granulation is not found outside of Pb poisoning except, inconstantly, in severe anemia or certain grave intoxications. The granules show as fine black spots scattered irregularly through the protoplasm. Pb is constantly present in the urine in Pb poisoning but the technic required to detect it is tedious. The spinal puncture fluid may also contain Pb. L. W. RIGGS

Acute mercurial poisoning from vaginal injection. M. C. SEXTON. *J. Am. Med. Assoc.* 78, 1445-6 (1922).—Report of a fatal case. L. W. RIGGS

Some factors contributing to toxicity of botulinus toxin by mouth. JACQUES BRONFENBRENNER AND M. J. SCHLESINGER. *J. Am. Med. Assoc.* 78, 1519-21 (1922); cf. C. A. 15, 3681.—Botulinus toxin is a poisonous substance elaborated by *Bacillus botulinus* and quite analogous to diphtheritic and tetanus toxins but much more potent than either. The crude filtrate from a botulinus culture, known as botulinus toxin; is of a composite nature contg. both the sp. botulinus toxin and some substance or substances nontoxic in themselves but capable of increasing the permeability of the intestine so as to permit the absorption of the sp. botulinus toxin. It can be absorbed by this route by virtue of the fact that it is resistant to the conditions of the H-ion concn. and to enzymes found in the digestive tract. The sp. botulinus toxin is capable of extraordinary increase in potency when it encounters the condition of H-ion concn. similar to that present in the stomach during active digestion. This increase in potency is so marked that were only an infinitesimal quantity of the acidified toxin absorbed into the general circulation, it would be sufficient to kill the animal. Since the potency of acidified toxin is again reduced when it is neutralized (as would occur in the small intestine), it seems likely that botulinus toxin is absorbed to a large extent from the stomach and upper duodenum. L. W. RIGGS

Synthetic dyes as antiseptic and chemotherapeutic agents. C. H. BROWNING. *Nature* 109, 750-1 (1922).—A review. W. H. ROSS

Value in quinidine in cases of auricular fibrillation. THOMAS LEWIS. *Am. J. Med. Sci.* 163, 781-94 (1922).—In only about 50% of cases of auricular fibrillation will quinidine restore the normal rhythm. Details regarding dosage and the mechanism of the reaction are given. G. H. S.

Influence upon toxicity and trypanocidal activity of shaking acid and alkalinized solutions of arspenamine and solutions of neoarsphenamine in air. J. F. SCHAMBERG, J. A. KOLMER AND G. W. RAIZISS. *Am. J. Syphilis* 6, 1-15 (1922).—The shaking of acid or alkalinized solns. of arspenamine increases the toxicity. With neoarsphenamine shaking for even 1 min. greatly increases the toxicity; shaking for 10 min. enor-

monously\* increases the toxicity. Neoarsphenamine should be dissolved with as little shaking and as little exposure to air as possible. Diff. lots and diff. brands of arsphenamine and neoarsphenamine vary in their liability to oxidation on shaking. Acid solns. of arsphenamine increase considerably in trypanocidal power by shaking for 1 min. but lose in activity with shaking for 10 min. The increase in trypanocidal action of alk. solns. is increased by shaking and remains high. The increased trypanocidal action is probably due to the formation of "arsenoxide" which is more active than arsphenamine. No increase in trypanocidal action accompanies the shaking of solns. of neoarsphenamine. G. H. S.

**Erythropoietic action, cumulative effect and elimination of germanium dioxide.** J. H. MÜLLER AND MIRIAM S. ISZARD. *Am. J. Med. Sci.* 163, 364-84(1922).—GeO<sub>2</sub> administered to guinea pigs, rabbits, dogs and man by the intraperitoneal or enteric routes exerts a marked erythropoietic action. Large doses are toxic and the toxic action is apparently associated with an over-stimulation of the blood-forming organs. The compd. does not accumulate in the body but is eliminated through the kidneys and alimentary tract. The lethal dose is about 586 mg. per kg. of body wt. Methods for the detn. of minute amts. of the compd. in tissues and excreta are given. With a single large dose in the rabbit the red count could be increased by over 1½ million cells per cu. mm. G. H. S.

**Effect of emetinized blood and serum from man and cat on pathogenic entamebae in stools.** WM. ALLEN. *Am. J. Trop. Med.* 2, 195-8(1922).—Since emetine is effective in the treatment of entamebic dysentery in man but is inert as regards a similar infection in cats study was made of the effects of emetine mixed *in vitro* with human and cat serum on entamebae, and also of the action of the sera of these animals when bled after therapeutic injections of the compd. The source of the serum had no effect on the toxicity of the emetine. G. H. S.

**Excretion of arsenic after serial administration of arsphenamine and neoarsphenamine.** F. P. UNDERHILL AND S. H. DAVIS. *Arch. Dermatol. & Syphilol.* 2, 40-50 (1922).—After the intravenous injection of arsphenamine or neoarsphenamine, as appears in the urine within a few hrs. and attains a max. excretion on the day of, or the day after, the injection. With serial injections the max. excretion is higher with each succeeding dose. Arsenic appears in the feces more slowly—within 3 or 4 days after the intravenous injection. In a series of injections the total percentage of As excreted in the feces is larger than in the urine, being as high as 53.76% in 1 week. It is suggested that in serial treatments a satn. of the tissues (at about the 4th injection) takes place and thereafter the arsenical prepn. is for the most part quickly eliminated from the body. This suggests the use of smaller doses once the satn. point has been reached. G. H. S.

**Elimination of arsphenamine and neoarsphenamine in the urine: the Abelin reaction.** B. B. BRIGSON AND P. G. ALBRECHT. *Arch. Dermatol. & Syphilol.* 2, 51-62 (1922).—Detns. made by a modified Abelin reaction show that this test is positive only in the presence of arsphenamine or its derivs. Urinary elimination of arsphenamine and its derivs. is usually complete or nearly so within 24 hrs. of the injection. Tertiary and neurosyphilis showed a delayed elimination. G. H. S.

**Fatty acids of chaulmoogra oil in the treatment of leprosy and other diseases.** H. T. HOLLMANN. *Arch. Dermatol. & Syphilol.* 2, 94-101(1922).—The fatty acids of chaulmoogra oil, either in the form of the Na salt or in the ethyl ester, are therapeutically active and show a decided bactericidal action on acid-fast bacteria. The technic for the prepn. of ethyl esters of the fatty acids of chaulmoogra oil is given. G. H. S.

**Phenolphthalein eruptions.** FRED WISE AND E. W. ABRAMOWITZ. *Arch. Dermatol. & Syphilol.* 2, 297-320(1922).—In susceptible individuals phenolphthalein provokes an eruption resembling the eruptions induced by antipyrine and arsphenamine. This

is of significance in view of the wide use of phenolphthalein in proprietary laxative compds. G. H. S.

**Melaninic acid and its action in the animal body.** O. ADLER AND W. WIECHOWSKI. *Arch. expl. Path. Pharm.* 92, 22-33(1922).—The melaninic acids, arising from the oxidation of tyrosine, tryptophan, and phenylalanine, when injected intravenously markedly reduced the coagulability of the blood, both *in vivo* and *in vitro*, reduced the number of platelets and caused a fall in the erythrocyte count. G. H. S.

**Mode of action of  $\beta$ -imidazoleethylamine (histamine).** II. PAUL SCHENK. *Arch. expl. Path. Pharm.* 92, 34-51(1922); cf. C. A. 15, 3332.—The frog liver was perfused with normal Ringer soln., with Ringer contg. adrenaline or histamine or both. The histamine in no way interfered with the formation of sugar; indeed, in large doses it very considerably increased sugar formation as well as the mobilization of glycogen under the action of the adrenaline. By local application or by subcutaneous injection histamine markedly dilates the capillaries. In most of its activities histamine acts in a manner directly opposite to that of adrenaline. The continued administration of histamine failed to induce an anemia in guinea pigs. When administered at short intervals (5 to 10 min.) the rabbit would withstand considerably more than an amt. which would be fatal if given at once, and although severe dyspnea followed the injections the electrocardiogram showed that the heart action remained regular. G. H. S.

**Tetralin urine.** W. RÖCKEMANN. *Arch. expl. Path. Pharm.* 92, 52-67(1922).—After periods of tetralin feeding it appears that in the dog this substance is oxidized to *ac*- $\alpha$ -tetralol and in the rabbit to *ac*- $\beta$ -tetralol. The  $\alpha$ -tetralol forms dihydronaphthalene and is in some part changed to naphthalene.  $\beta$ -Tetralol is dextrorotatory, forms a typical picrate, and may also yield dihydronaphthalene. With picric acid both dihydronaphthalene and tetralin form cryst. compds. When fed to rabbits for a period of two weeks tetralin caused a decrease in the output of urine. With dogs it caused oliguria with albuminuria and casts. Large amts. damage the kidney. G. H. S.

**Mode of action of the narcotic gases, nitrous oxide and acetylene.** HERMANN WIELAND. *Arch. expl. Path. Pharm.* 92, 96-152(1922).—When mixed with air or O, N<sub>2</sub>O is not inactive because of a reduction in partial pressure but because the presence of any considerable amt. of O does not permit the narcotizing action to become operative. Phenomena of life which are not dependent upon the presence of O are no more affected by N<sub>2</sub>O than by an indifferent gas. From this it appears that the narcotic effects of nitrous oxide are associated with a deranged O absorption or utilization. In many respects the action of acetylene resembles that of N<sub>2</sub>O: Anoxybiotic processes are not affected; more highly organized animals and man are quickly narcotized. Corresponding to the greater soly. in water, acetylene is the more active so that even in the presence of a considerable amt. of O it is effective. The mechanism through which the oxidative processes of the central nervous system are disturbed by the inhalation of N<sub>2</sub>O or acetylene is not clear. G. H. S.

**Action of adrenaline on the blood vessels of man.** B. FORNET. *Arch. expl. Path. Pharm.* 92, 165-72(1922).—Not only the degree or increase in blood sugar but also the duration of the reaction must be taken into account in estg. the effect of the administration of adrenaline. In man the law of Straub-Ritzmann (the proportions of subcutaneously injected adrenaline which remain effective and which are oxidized) does not hold. Adrenaline is not oxidized either in the blood or in the tissues. Apparently all of the subcutaneously injected adrenaline is resorbed, and in accordance with the speed of the resorption the effect is strong, moderate or absent. The time required for the resorption can be readily influenced; heat favors, cold retards, the process. Incidentally, it is not satisfactory to test adrenaline by subcutaneous injection. G. H. S.

**Pharmacologic investigations on the respiratory center.** II. Action of Iobeline

and lobelia alkaloids on the narcotized or morphinized respiratory center. Action of lobeline on the circulation. HERMANN WIELAND AND RUDOLF MAYER. *Arch. expil. Path. Pharm.* 92, 195-230(1922).—The various poisons paralyze the respiratory center in quite diff. manners and the extent of the paralysis is related to the manner in which the process is induced, as well as to the concn. of the active substance. Injections of lobeline very readily react upon morphine paralysis, somewhat less readily upon urethan, while chloral hydrate intoxication is influenced only with considerable difficulty. The amt. or concn. of lobeline necessary to stimulate the respiratory center is greater as the paralysis of the center, as indicated by the respiratory vol. per min., is more severe. In rabbits intravenous injection of small doses stimulates the respiratory center and at the same time causes a vagal stimulation with fall in blood pressure, retardation of pulse, and cramp-like closure of the bronchi. Larger doses paralyze the respiratory center and still larger ones produce clonic-tonic convulsions. Cryst. lobeline in high concn. reacts upon the heart muscle; it has no atropine effect upon the vagus endings in the bronchial musculature and heart. Lobelidine,  $C_{20}H_{21}O_2N$ , differing from lobeline only in lacking a  $C_2H_5$  group, and an alkaloid designated as "base B,"  $C_{22}H_{27}O_2N(?)$ , also stimulated respiration but only to about half the extent of lobeline. Their other activities were comparable to those of lobeline. To obtain any effect on respiration, other than a transitory stimulation, it is necessary to maintain a const., although low, concn. of the substance in the blood, and this can best be obtained by subcutaneous or intramuscular injection.

G. H. S.

Mechanism of the contraction induced by poisons in striated muscle. II. Nicotine and potassium salts with frog muscle. OTTO RIESSER AND S. M. NEUSCHLOSZ. *Arch. expil. Path. Pharm.* 92, 254-72(1922).—The primary contraction which nicotine produces in the frog gastrocnemius follows in all of its manifestations the same laws as does the acetylcholine contraction. It can be abolished or prevented not only by curare but by atropine and novocaine as well. The antagonistic actions of atropine and novocaine are not specific. The mechanism of the actions is physical or of a colloidal chem. nature. Stimulation contracture is a general property of skeletal muscle and the receptive substance is excited not only by specific poisons, as acetylcholine or nicotine, but by many other substances. Potassium produces an initial shortening of the skeletal muscle quite independently of the paralyzing action of poisons on the contractile substance.

G. H. S.

Toxicology of arsine. II. Toxicity for warm-blooded animals. HERMANN FÜHNER. *Arch. expil. Path. Pharm.* 92, 288-301(1922).—White mice in a narcosis flask were intoxicated with  $AsH_3$  produced in the flask through the interaction of  $Ca_3As_2$  and water. At a gas concn. of a few mg. per l. of air the animals died within a half hour, at a concn. of 0.5 to 1 mg. death occurred in about 1 hr., at 0.1 to 0.2 mg. within 2 to 4 hrs. Exposure for 30 min. to a concn. of 0.1 mg. is not surely lethal whereas a concn. of 0.15 mg. for this length of time always results in death within 1 or 2 days. By subcutaneous injection the lethal dose of  $As_2O_3$  is somewhat higher per g. of body wt. than that reckoned on the basis of the exposure to  $AsH_3$ .

G. H. S.

Action of gases on the isolated rabbit intestine. WERNER TESCHENDORF. *Arch. expil. Path. Pharm.* 92, 324-34(1922).—The action of various gases and vapors upon the rabbit intestine was detd. under conditions of controlled pressure and concn. The pharmacol. action depended in general upon their ability to be absorbed; only those with a high absorption coeff. were active.  $CO_2$  was as inert as air.  $H_2S$  in high diln. paralyzed the muscle.  $EtCl$  stimulated it.  $H$ ,  $O$ ,  $N$ ,  $CO$ ,  $N_2O$ , methane, ethane, and pentane vapors had no specific effect.

G. H. S.

Pharmacologic modification of kidney function. E. STARKENSTEIN. *Arch. expil. Path. Pharm.* 92, 339-92(1922).—Atophan increases the diuresis in adrenaline gluco-

suria, whereas by itself atophan has no diuretic effect. Sugar solns. injected intravenously are quickly eliminated by atophan but since saline infusions react in the same way it appears that hyperglucemia is not essential. Unlike other diuretics atophan is without effect on normal animals. Factors which regulate the output of urine are (1) the amt. and distribution of the fluid intake, (2) the compn. of the fluid taken, and (3) the mode of introduction of the fluid. As for the manner of intake, if 3750 cc. are ingested within a few hrs. the output in the next 24 hrs. may amt. to 104 %, whereas if the same amt. of intake is distributed over 16 hrs. the output during 24 hrs. may be only 55%. As for the compn., 1 l. of water is almost completely eliminated in 6 to 7 hrs., whereas 1000 cc. of isotonic fluid is in large part retained in the body. Isotonic fluids are readily retained, hypo- or hypertonic fluids are not. Intravenously introduced fluids are most quickly eliminated. Since atophan has no effect upon the normal or edematous organism, but serves to accentuate a diuresis already established, it appears that unlike most diuretics, it does not contain an extrarenal component but contains a renal factor only. Independent of the diuresis atophan favors the elimination of uric acid and acetone, and in parallel with the diuresis the elimination of chlorides and sugar, and under the conditions mentioned, of water. The cause of these activities can be only either a stimulating effect on the secreting elements or a paralysis of a nervous inhibitory mechanism.

G. H. S.

**Time of resorption of gases from the peritoneal cavity.** WERNER TESCHENDORF. *Arch. expl. Path. Pharm.* 92, 302-23(1922).—Rabbits received 100 cc. of various gases or vapors into the peritoneal cavity and the rate of absorption was detd. by röntgenologic examn. The following rates are recorded as av. values for the substances mentioned: N 80 hrs., pentane 26 hrs., H 25 hrs., CH<sub>4</sub> 25 hrs., O 24 hrs., CO<sub>2</sub> 17 hrs., ethane 8 hrs., N<sub>2</sub>O 2 hrs., CO 1 hr., H<sub>2</sub>S 5 min. EtCl 5 min., ether 2 min. With the quantity which was administered narcosis did not result. H<sub>2</sub>S quickly caused respiratory paralysis and death. The adsorption of the gases followed the physical laws of adsorption through fluid layers, although gases with particular affinity for body fluids were absorbed more quickly than would be expected from Exner's law.

G. H. S.

**Action of cocaine on the frog heart and its tolerance to the compound.** M. KOCHMANN. *Arch. ges. Physiol.* (Pflüger's) 190, 158-72(1921).—In high concns.,  $\frac{1}{200}$  mol., cocaine causes diastolic arrest, first of the ventricle and later of the auricle. Lower concns.,  $\frac{1}{20,000}$  mol., retard the beat and reduce the amplitude of the contraction and finally stop heart action. Concns. from  $\frac{1}{200,000}$  to  $\frac{1}{100,000}$  mol. also retard the action; between  $\frac{1}{100,000}$  and  $\frac{1}{300,000}$  mol., the drug may have a stimulating effect; below this concn. the solns. are inactive. The effect is a reversible one since the heart recovers when placed in pure Ringer soln. Similar effects as regards cessation of heart action take place when the cocaine is injected into the lymph sac. When exposed to not too high concns. spontaneous recovery takes place, due in part to destruction of the cocaine and in part to a tolerance to the drug.

G. H. S.

**Combined action of ions and organic poisons.** HANS HANDOVSKY. *Arch. ges. Physiol.* (Pflüger's) 190, 173-6(1921).—The degree of hemolysis of rabbit erythrocytes by saponin in diff. solns. was detd. When suspended in sugar solns. saponin caused much less hemolysis than when the cells were suspended in NaCl solns.

G. H. S.

**Physiology and pharmacology of musculature of the leech.** WERNER TESCHENDORF. *Arch. ges. Physiol.* (Pflüger's) 192, 135-62(1921).—The cutaneous musculature of the leech (*Hirudo medicinalis*) is almost completely free of nerve centers and has but a slight tonus which can be influenced through chem. means, and normally shows no spontaneous contractions. It reacts to tension by contraction. Temp. affects it somewhat; between 33 and 44° there is a slight extension, between 45 and 51° there is a very slight contraction, and irritability begins to disappear. Heat rigor occurs at 60°.

**Reactivity to elec. stimuli** is in general slight. Tonus is but little influenced by change in osmotic pressure so that in testing pharmacol. preps. such sources of error can be neglected. Changes in osmotic pressure have, however, a very marked influence on the survival of the prepn. The tonus of the tissue is increased by the anions  $\text{NO}_3$ , I, and  $\text{SCN}$ . Cl, Br,  $\text{PO}_4$  and  $\text{ClO}_3$  are inactive. Na, Li, and K ions exert quite different effects upon the muscle.  $\text{NH}_4$  ions increase the tonus. Ca has no effect upon tonus but increases the survival of the prepn. Ba increases the tonus; Sr is intermediary between Ca and Ba in its action. Mg lessens the tonus and is antagonistic to Ba. OH ions increase the tonus and cause a contraction. H ions either decrease or do not change the tonus. In weak concn. acids stimulate, in stronger concn. they paralyze and kill the prepn. In Ringer soln. the preps. remain active for 8 to 12 days in the ice-box, and this duration of activity can be extended by the addition of colloids to the soln. Alc. relaxes, ether stimulates, and  $\text{CHCl}_3$  stimulates slightly and then kills the prepn.

G. H. S.

**Effect of temperature on hemolysis due to hypotonic solutions.** ADOLF JARISCH. *Arch. ges. Physiol.* (Pflüger's) 192, 255-71(1921).—In hypotonic solns. the resistance of erythrocytes is markedly influenced by temp. The cells of diff. species showed considerable variation in the change in tonicity of solns. which produced lysis at  $0^\circ$  and at  $45$ - $50^\circ$ . The effect of H and of OH ions upon the changes in resistance was detd. by employing buffer mixtures, both phosphate buffers for maintaining a const. H-ion concn. with a variable OH, and ammonium buffers for inducing a variable OH concn. with a const. H.

G. H. S.

**Chemical processes in antagonistic nerve action.** LEON ASHER. *Arch. ges. Physiol.* (Pflüger's) 193, 84-5(1922).—In 55 of 58 expts. the K-free Ringer soln. taken from a heart prepn. subjected to vagus stimulation increased the activity of a second heart, also in a K-free soln.

G. H. S.

**Effect of corpus luteum extract upon erythropoiesis in rabbits rendered anemic artificially.** E. ROTHLIN. *Arch. ges. Physiol.* (Pflüger's) 193, 102-8(1922).—Corpus luteum ext., administered either by ingestion or by subcutaneous injection to rabbits rendered anemic by bleeding, did not modify the regeneration of erythrocytes. Although without effect on female rabbits, in males the feeding of dried corpus luteum appeared favorably to affect restoration of the hemoglobin and the cell count.

G. H. S.

**Relation of the rest current to irritability. II. Spinal cord of the frog.** HERMANN VORLBERG. *Arch. ges. Physiol.* (Pflüger's) 193, 313-6(1922).—Expts. with narcosis ( $\text{CHCl}_3$  and ether) on the one hand, and with strychnine and cocaine on the other, showed that irritability and the rest current are entirely independent, since one could be altered without effecting a change in the other type of reaction.

G. H. S.

**Choline and the hormone of intestinal motion. VI. Experimental therapy of gastrointestinal paralysis after peritonitis and laparotomy.** K. ARAI. *Arch. ges. Physiol.* (Pflüger's) 193, 358-95(1922).—A typical sero-fibrinous peritonitis with characteristic anatomical and pathol. changes in the peritoneum can regularly be produced in cats by the intraperitoneal injection of a 2% Lugol's iodine soln. (0.5 cc. per kg. of body wt.). The peritonitis attains its max. in 48 to 72 hrs. and heals spontaneously in a week, but during this period it serves admirably for therapeutic expts. In such an iodine peritonitis peristalsis is weakened within 24 to 48 hrs. but this inhibition could be removed by the intravenous injection of 10 mg. per kg. of choline chloride. Throughout the peritonitis the choline content of the intestine remained normal, and surviving intestinal tissue taken from an animal with peritonitis responded normally to choline. By laparotomy with manipulation of the intestine a typical post-operative paralysis could be produced, and here again the injection of choline was beneficial. The choline content of the intestine was not decreased. The lethal dose of choline chloride for mice was 0.7 g. per

kg. (subcutaneous); cats withstand without disturbance 25 mg. per kg. intravenously. The effect of the choline is related to the rapidity with which it is injected. The toxicity of choline borate (enzytol) is exactly proportional to its content in choline. G. H. S.

**Effect of vascular stimulating agents on the elasticity of the arterial wall.** J. SCHLIER. *Arch. ges. Physiol.* (Pflüger's) 193, 610-20(1922).—The effect of adrenaline and  $\text{BaCl}_2$  upon the extensibility of blood vessels was detd. by testing the vessels of the frog for pressure and rate of flow by perfusion both before and after the administration of the test substance. Tests were made under increased and diminished pressures. The contracted vessels had a relatively higher elasticity than those which were not contracted.

G. H. S.

**Chemical contraction of narcotized muscle as compared with normal.** ALBRECHT BETHE, MARTHA FRAHNKEL, AND JOSEF WILMERS. *Arch. ges. Physiol.* (Pflüger's) 194, 45-76(1922).—Sartorius muscle which is narcotized to complete loss of response to induction stimuli can be thrown into a strong contraction by  $\text{CHCl}_3$ ,  $\text{HCl}$ , or  $\text{NaOH}$ . Various narcotics—methanol, ethyl, propyl, amyl and heptyl ales., ethyl- and phenylurethan, benzamide and salicylamide, veronal,  $\text{KCl}$ ,  $\text{CaCl}_2$ , cane sugar, medinal, novocaine—were employed, but the type used failed to modify the  $\text{CHCl}_3$  response. The latent period in  $\text{CHCl}_3$  contraction is always essentially shorter in narcotized muscle and the curve of contraction is always more abrupt than in normal tissue. With  $\text{HCl}$  and  $\text{NaOH}$  contractions the type of narcotic is of significance, particularly with  $\text{NaOH}$ , many narcotics exerting a depressive action on the curve of contraction. However, with all, if used is sufficient concn. a depressive effect is noted. Certain narcotics increase the abruptness of the contraction induced by  $\text{HCl}$ , others, as the depressing methanol and heptyl alc., decrease the  $\text{HCl}$  response. Some narcotics (propyl and amyl ales.) do not modify the  $\text{NaOH}$  contraction, others (methanol and heptyl alc.) reduce the response, and still others (sugar, medinal) completely inhibit the stimulating effect. G. H. S.

**Chemical contraction of mammalian muscle preparations which retained, or which were deprived of, their electrical irritability.** ADOLF SCHOTT. *Arch. ges. Physiol.* (Pflüger's) 194, 271-92(1922).—The reactivity of surviving mammalian muscle (rectus abdominis of the white mouse), which was entirely normal as regards elec. irritability, was compared with similar tissue which had lost its activity as a result of cooling, of heating to the onset of rigor, or of long standing in Ringer soln. The test substances were satd.  $\text{CHCl}_3$ -Ringer, 0.02  $N$   $\text{NaOH}$  and 0.01  $N$   $\text{HCl}$  in Ringer soln.  $\text{CHCl}_3$  and  $\text{NaOH}$  were active at all temps. even though the tissue showed no response to elec. stimuli. The activity of  $\text{HCl}$  bore some relation to temp.; between 1 and 5° it was inactive; at 18-19° it was stimulating. The effect of the  $\text{HCl}$  could also be correlated with the condition of the muscle, in that the older the prepn. the less marked was the response elicited by the acid. The successive application of two contraction-producing agents showed:  $\text{NaOH}$  after  $\text{CHCl}_3$  usually resolved the contraction;  $\text{HCl}$  after  $\text{CHCl}_3$  always caused relaxation;  $\text{CHCl}_3$  after  $\text{NaOH}$  was inactive in half of the cases and in the remainder intensified the contraction.

G. H. S.

**Cause of the shortening of dried muscle fibers upon the addition of fluids.** WOLFGANG STRAUPE. *Arch. ges. Physiol.* (Pflüger's) 194, 574-8(1922).—Of a large series of acids tested,  $\text{CO}_2$  in satd. soln. in water was the only one which had a marked effect upon the shortening of the muscle fibers. With this acid the change in length amounted to 16%.

G. H. S.

**Viscosity of the blood in morphine intoxication.** PAUL SOLLIER. *Bull. acad. méd.* 87, 428-31(1922).—During the period of intoxication there is an increase in both the red and white cells, a change in the differential count, and very considerable increase in the viscosity, associated with changes in the cellular elements rather than with plasma alterations.

G. H. S.

**Physostigmine in cardiac therapy.** JEAN MINET, R. LÉGRAND AND PRELOT. *Arch. mal. du cœur* 15, 60-80(1922).—Extended clinical observation of the use of physostigmine in cardiac cases indicates that in rare cases of tachycardia accompanied by exaggerated tonus of the sympathetic system it may be of considerable value. However, its action is slow, inconstant, and often very transitory. In other forms of arrhythmia it is of no practical value. G. H. S.

**Atropine and strophanthin.** T. LEWIS, A. N. DRURY AND C. C. ILIESCU. *Heart* 9, 21-53(1922).—By depriving the heart of its vagal tone atropine increases the length of the refractory period and consequently disturbed intra-auricular conduction and disturbed conduction at the A-V junction are increased. In minute doses strophanthin affects the muscle of the dog heart if a high rate of auricular beating is maintained. Strophanthin does not alter the rate at which fibers conduct impulses and probably when strophanthin blocks the impulses of a fluttering or fibrillating auricle from passing to the ventricle it does so, in part at least, by prolonging the refractory period of the auriculoventricular node. In the later stages of strophanthin poisoning in dogs a condition of intra-auricular block is developed, which is a refractory period effect. G. H. S.

**Action of quinidine upon the dog heart; with special reference to its action on clinical fibrillation of the auricles.** THOMAS LEWIS, A. N. DRURY, C. C. ILIESCU AND A. M. WEDD. *Heart* 9, 55-85(1922).—Quinidine sulfate given to dogs in doses comparable to those used clinically lowers the S-A rate considerably, reduces the rate of conduction in auricle and ventricle, depresses the A-V conduction, lengthens the absolute refractory period of the auricular muscle, and causes a partial (rarely a complete) paralysis of the vagus. A reversed action of the vagus upon A-V conduction may be produced by quinidine. G. H. S.

**Reversal of vagus action by quinidine as seen in the heart of the cat.** H. H. DALE. *Heart* 9, 87-9(1922).—The reversal of vagus action induced by quinidine is similar to effects seen after nicotine, curari, and other alkaloids having a similar type of action. The partial or complete paralysis of vagal action produced by quinidine is not due to an atropine-like action. Paraldehyde facilitates the production of reversed vagus action, and it is suggested that the action of the vagus on the heart is never perfectly normal in the cat under paraldehyde. G. H. S.

**Ventricular tachycardia as the result of the administration of digitalis.** CARL SCHWENSEN. *Heart* 9, 199-203(1922).—Two cases are reported in which it appears that the administration of digitalis directly caused attacks of ventricular tachycardia with death a few days later. G. H. S.

**Action of certain drugs upon fibrillation of the auricles.** T. LEWIS, A. N. DRURY, A. M. WEDD AND C. C. ILIESCU. *Heart* 9, 207-67(1922).—The effects of alkaloids of the cinchona series (quinidine, hydroquinidine, and quinine), digitalis, atropine and quinidine alone or combined, and diff. salts of quinidine (sulfate, bisulfate, and bi-hydrochloride) upon auricular fibrillation were studied. When given by mouth there is no material difference between the reactions by the salts of quinidine having diff. soly. The reaction is related in its degree to the dose of quinidine given. Weight for weight, quinidine has 5 to 10 times as powerful an action as quinine; hydroquinidine is very slightly more powerful than quinidine. When given in full doses digitalis increases the rate of the fibrillating auricle and the reaction of such an auricle to quinidine is adversely affected by digitalis. This adverse effect is more than counterbalanced by the control which digitalis exerts on the ventricular rate. As a rule atropine slows the fibrillating auricle. Digitalis exerts its action on the ventricle in part directly and in part through the vagi, and when digitalis quickens the fibrillating auricle or converts flutter into fibrillation it does so by exerting a preponderating action through the vagus nerves. The actions of atropine, quinidine and digitalis upon the fibrillating auricle are fully



explained by the theory of circus movement. When used in clinical cases of auricular fibrillation quinidine produces only a partial paralysis of the vagi, but does produce a slight grade of A-V block. G. H. S.

**Silicic acid injections and hyperleucocytosis.** A. KÜHN. *Mediz. Klin.* 18, 9-11 (1922).—After the intramuscular injection of  $\text{SiO}_2$  a hyperleucocytosis of 200 to 400% occurs within 1 hr. The intravenous injection of Na silicate causes an immediate leucocytosis, the count going quickly from 8000 to 26000 cells. In both instances the high count is transitory. The differential count during the leucocytosis offers nothing of diagnostic value, the increase being largely in multinuclear neutrophils (increase of 68 to 85%) while the number of lymphocytes decreases. G. H. S.

**Action of the potassium ion on spasmodophilia in children.** ANDREAS WETZEL. *Z. Kinderheilk.* 32, 105-20(1922).—Children were fed K chloride, citrate, and mono- and dipotassium phosphates for variable lengths of time, and their reactivity to elec. stimuli was detd. There is no evidence that the K ion as such increases irritability. G. H. S.

**Experimental generalized analgesia after exposure to some war gases.** JOHN ADER. *J. Exptl. Med.* 35, 97-114(1922).—Cats gassed with  $\text{Me}_2\text{SO}_4$  or  $\text{CCl}_4\text{NO}_2$  in such concn. that death generally results within 4 days usually exhibit a marked generalized analgesia, both superficial and deep. This develops within a few hrs. after gassing and reaches its max. in about 24 hrs. With  $\text{Me}_2\text{SO}_4$  the analgesia may persist for 6 mo.; with  $\text{CCl}_4\text{NO}_2$  practically normal sensitiveness has been observed 7 days after gassing. This analgesia is considered to be caused and maintained largely by a general, low-grade tissue asphyxia which is chiefly of pulmonic origin. C. J. WEST

**Erythropoietic action of germanium dioxide.** FREDERICK S. HAMMETT, JOSEPH E. NOWRREY, JR. AND JOHN H. MÜLLER. *J. Exptl. Med.* 35, 173-80(1922).—Germanium dioxide causes a marked and sustained rise in the no. of erythrocytes in blood which ranged from 1 to nearly 5 millions. The size of the dose did not seem to be important. The effect seems to be quick in making its appearance. The oxide also tends to increase the coagulability of the blood. C. J. WEST

**Action of four aromatic cinchona derivatives on pneumococcus. A comparison with optochin.** L. D. FELTON AND KATHARINE M. DOUGHERTY. *J. Exptl. Med.* 35, 761-80(1922).—With one strain of pneumococcus hydroquinine chloroacetanilide hydroquinine *p*-chloroacetylaminophenol hydrochloride, hydroquinine *m*-chloroacetylaminophenol hydrochloride and hydroquinine 4-chloroacetylaminopyrocatechol hydrochloride have a rapid pneumococcal activity both *in vitro* and in the peritoneal cavity of mice and to a lesser extent in rabbits. Optochin is slower in action but its power is not so easily destroyed either *in vitro* or *in vivo*. A comparison is made of the rapidity of *in vitro* bactericidal action and intraperitoneal toxicity. The chemotherapeutic action of the aromatic compds. is essentially local in character. Intravenous injection of the drugs in small doses destroyed to a greater or less extent the natural defenses of the animal, optochin being perhaps less injurious than the aromatic compds. The max. tolerant dose in a single injection is not so efficacious as the same dose divided in fifths and injected at 1 hr. intervals. There is a zone between the therapeutic and toxic doses, both single and repeated, for all these chemicals alike, where the natural resistance of the animal to an infection is reduced. C. J. WEST

**Relation of histamine to intestinal intoxication. I. Presence of histamine in the human intestine.** JONATHAN MEAKINS AND C. R. HARRINGTON. *J. Pharmacol.* 18, 455-65(1922).—The presence of histamine in minute concn. is demonstrated in the cecum and in the transverse colon. Its formation is apparently not dependent upon the existence of intestinal obstruction, since it occurs several weeks after the obstruction has been removed. It could not be detected in the feces. C. J. WEST

**Uterine effects of intravenous injections of fluids.** H. G. BARBOUR AND F. H. RAPOPORT. *J. Pharmacol.* 18, 407-22(1922).—The tone of the uterus varies inversely with the salt concn. of the blood when altered by intravenous injections, and is independent of blood pressure and changes in blood vol. Injection of whole blood increases the rate of uterine contractions, while loss of blood abolishes them. When acids or alkalis are injected the tone varies in the same direction as the  $H^+$  concn. of the blood. C. J. WEST

**Mode of action of potassium upon isolated organs.** A. J. CLARK. *J. Pharmacol.* 18, 423-47(1922).—Rubidium acts as a perfect substitute for K in all of the isolated tissues examd. Cesium acts as an imperfect substitute. Thorium and uranium do not act as substitutes but they act as irritants to the frog heart and will induce automatic beats in hearts arrested by lack of K. C. J. WEST

**Scopolamine-morphine narcosis.** W. STORM VAN LEEUWEN AND A. VON SZENT GYORGYI. *J. Pharmacol.* 18, 449-54(1922); cf. *C. A.* 15, 2673.—Monkeys are sensitive to doses of 5 to 10 mg. morphine, given subcutaneously. They are very insensitive to scopolamine; doses of 200 mg. of this drug given subcutaneously do not produce any visible effect. A dose of 500 mg. given to 1 animal proved fatal. Scopolamine does not augment the action of morphine on the monkeys as far as concerns the external symptoms produced by this drug. C. J. WEST

**Effects of some new local anesthetics (*p*-aminobenzoyldibutylamino-ethanol and -propanol; diethylaminopropylidiphenylaminocarbiniol).** M. L. BONAR AND TORALD SOLLMANN. *J. Pharmacol.* 18, 467-89(1922).—*p*-Aminobenzoyldibutylaminopropanol-HCl (sulfate is known as *butyn*) produces complete anesthesia on surface application to mucous membrane in concns. about 0.5 those of cocaine, 0.1 those of procaine or about those of holocaine. It has the important advantage of being non-irritant. Its toxicity is about that of cocaine and, therefore, considerably higher than that of procaine. It may be useful for anesthesia of the eye. The other 2 compds. are not promising. C. J. WEST

**Action of salicylates on the uterus.** J. W. C. GUNN AND MORRIS GOLDBERG. *J. Pharmacol.* 19, 207-13(1922).—Na salicylate has a stimulating action in the uterus, but usually only in concns. higher than those found in the blood during the treatment of rheumatic fever. C. J. WEST

**Adrenaline hyperglucemia in man.** HENRY L. ULRICH AND HAROLD RYPINS. *J. Pharmacol.* 19, 215-20(1922).—A concn. of the blood following adrenaline as observed in dogs is not paralleled in man. The max. intravenous dosage of adrenaline in man is approx. 0.33 cc. of 1:1000 soln. in a 70-kg. man, which corresponds to about  $\frac{1}{180}$  of the physiologic intravenous dose per kg. in dogs. Intravenous adrenaline caused a wide and inconsistent fluctuation in the concn. of blood creatinine and blood urea N. C. J. W.

**Action of potassium salts on the medulla as shown by perfusion of the medulla of the terrapin (*Pseudomys troostii*) with potassium salts.** W. J. R. HEINEKAMP. *J. Pharmacol.* 19, 239-45(1922).—Potassium influences the cardio-inhibitory center of the terrapin, producing inhibition of the heart. C. J. WEST

**Functional evidence of the phylogeny of the nervous system as shown by the behavior and resistance of the developing rat to strychnine.** E. W. SCHWARTZ. *J. Pharmacol.* 19, 273-91(1922); cf. *C. A.* 16, 1990.—Sometime after birth the rat begins to lose its natal resistance to strychnine; several days after the opening of the eyes the rat acquires the adult type of reaction at which time the lethal dose is at the lowest limit 0.5 mg. per kg. Subsequently a post natal immunity is acquired and at maturity it has an absolute value of 6 times that exhibited on emergence from the "crawling stage." C. J. WEST

**Changes with advancing age in the resistance of the albino rat to arsenic.** F.

S. HAMMETT AND J. E. NOWREY, JR. *J. Pharmacol.* 19, 331-5(1922).—With advancing age there is a progressive diminution in the resistance of the albino rat to death from As poisoning. The fatal dose varies from 11 mg. at 60-90 days of age to 8 mg. at 210-240 days. The differences are attributable in large part to differences in metabolic rates.

C. J. WEST

Relative toxicity of germanium and arsenic for the albino rat. F. S. HAMMETT, J. H. MULLER AND J. E. NOWREY, JR. *J. Pharmacol.* 19, 337-42(1922).— $\text{CeO}_2$  can be administered subcutaneously in doses up to 180 mg. per kg. of body wt. of the exptl. animal with no apparent harmful effects, while  $\text{As}_2\text{O}_3$  produces a fatal result in the ratio of 8 mg. per kg. of body wt. The albino rat is more resistant to poisoning by As than is man. This is due to the difference in the degree of the protein metabolism of the 2 species.

C. J. WEST

# I—ZOOLOGY

R. A. GORTNER

Amphibian metamorphosis and pigment responses in relation to internal secretions. J. S. HUXLEY AND L. T. HOGGEN. *Proc. Roy. Soc. London* 93B, 36-53(1922).—Salamandra and Triton larvae may be metamorphosed by immersion in a dil. aq. soln. of I (satd. aq. soln. dild. with water from 1:50 to 1:1000). Low temps. retard metamorphosis, while high temps. at first produce increased growth of the gills. A thyroid diet causes metamorphosis of sexually mature axolotls. Exophthalmos apparently accompanies metamorphosis in all amphibia. The time required for metamorphosis of axolotl is considerably longer when that phenomenon is induced by enforced air-breathing than when it is induced by thyroid-feeding. The thyroid diet produces metamorphosis more slowly in sexually mature axolotl larvae than in young larvae. Increase in temp. accelerates their metamorphosis. Administration of I free of org. combination or fresh glandular substance of the prostate or anterior lobe of the pituitary has no influence upon the metamorphosis of axolotl. Feeding with thyroid for 7 months produces no noteworthy somatic changes in *Necturus*. Feeding with either the whole pituitary gland or its posterior lobe causes a marked temporary dilation followed by an excessive contraction of the dermal melanophores of albino axolotl. Ext. of adrenal medulla gives rise to a temporary complete contraction of the dermal melanophores of axolotl. Administration of the pineal gland as its ext. or as a food rapidly produces a striking transient contraction of the dermal melanophores in frog tadpoles but has no action upon these organs in axolotl.

JOSEPH S. HEPBURN

Changes produced in the larval brain of *Rana pipiens* by thyroid feeding. W. B. COOKSEY. *Endocrinology* 6, 393-401(1922).—Thyroid powder mixed with powdered clover leaves and flour was fed twice a day to a large series of frog tadpoles. Exptls. and controls were carefully matched in size. The thyroid accelerated metamorphosis and exerted a toxic effect, greatest in summer, less in spring and least in autumn. The larger tadpoles survived longer and metamorphosed to a greater extent. In all parts of the brain of the treated tadpoles, adult characteristics were evident. The body length decreased 15.9% the brain length increased 1.8%. Many striking abnormalities were produced in various parts of the brain because of pressure from surrounding structures. These were due to abnormal differential rates of growth.

F. S. HAMMETT

The physiological effects of X-rays. I. The variation in the lethal dose during metamorphoses in the fruit fly, *Drosophila*. J. W. MAVOR. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 55, 283(1921).—There is a period in pupation of *Drosophila*, lasting from 12 to 18 hrs., during which the resistance to X-rays increases tenfold. J. F. L.

Effect of ethyl alcohol on tadpoles. S. O. MAST AND Y. IBARA. *Am. J. Physiol.* 59, 294-7(1922).—A weak soln. (0.33 to 0.66%) of EtOH causes an increase in the rate

of growth in tadpoles and tends to reduce the rate of mortality. It probably serves as a food thus conserving body materials.

J. F. LYMAN

**The action of ultra-violet rays on starfish eggs.** R. S. LILLIE AND M. L. BASKERVILLE. *Am. J. Physiol.* 61, 57-71(1922).—The effects produced in unfertilized eggs by brief radiation with ultra-violet rays resemble those of partial activation. The immediate change produced in the egg system is of the same essential nature as that caused by temporary exposure to high temp. or other activating agent. The primary effect of the rays is probably a structural change, i. e., a change in the colloidal substratum of the protoplasm and probably of the surface layer, upon which follow sp. chem. effects as a secondary consequence.

J. F. LYMAN

**Nutrition of the protozoa.** R. A. PETERS. *Proc. Physiol. Soc., J. Physiol.* 54, 1(1921).—*Colpidium* can obtain its entire N nourishment from ammonium salts. Ammonium glycerophosphate serves as a complete source of N, C and P. C in the form of carbonate, formate, oxalate, glycollate or citrate is not available; the C of tartrate can be utilized.

J. F. LYMAN

**The light of the Java firefly (*Luciola vittata* Cast).** F. C. GERREYSEN. *Biol. Zentr.* 42, 1-9(1922).—Eggs of the *Lampyridae* emit generalized light which concentrates to a definite spot after the embryo develops. Eggs of the *Luciola* emit the light from this spot in periods of several min. each. Periodic lighting is controlled by the living insect and can be produced in the dead insect by the passage of an elec. current. The lighting is conditioned by an intermittent reduction of the O supply in the capillary air passages under the influence of nerve stimulation. Narcosis proceeds in 3 definite steps in the *Lampyrida*: reversible extinction, reappearance of light, and finally irreversible extinction of light. The presence of a sp. light-producing material and of an enzyme (luciferase) was demonstrated in the *Luciola*.

W. A. PERLZWEIG

**Conditions of copulation and secondary sexual characteristics in the *Ustilago violacea*.** ROBERT BAUCH. *Biol. Zentr.* 42, 9-37(1922).—The copulation process of the sporidia of *Ustilago violacea* depends upon the O supply and continuity of the gas metabolism. The presence of an excess of alkali or of small amts. of acid inhibit the process. It is further inhibited by the osmotic effects produced by an excessive concn. of carbohydrates, proteins and salts in the culture media. The process is independent of light, but is affected by temp. changes. Exhaustion of the food supply and accumulation of metabolic waste products do not seem to affect it. The production of secondary sexual characteristics in cultures of *Dianthus deltoides* was found to be influenced by the general nutrition, the presence of protein cleavage products, and of certain mineral salts. Secondary sexual characteristics gradually disappear if the sporidia are cultivated for a long period in the same nutritive medium.

W. A. PERLZWEIG

**Effect of overripening upon the eggs of *Rana temporaria*.** HERMANN EIDMANN. *Biol. Zentr.* 42, 97-108(1922).—Overripening of eggs of *R. temporaria* resulted in the production of a greater number of males than females as was shown by Hertwig for *R. esculenta*.

W. A. PERLZWEIG

**Influence of the adrenal cortex upon the health and growth of various organisms.** M. A. VAN HERWERDEN. *Biol. Zentr.* 42, 109-12(1922).—One-2 mg. of dried adrenal cortex tissue when added to 10-15 cc. of hay infusion contg. *Daphnia pulex* stimulated growth and accelerated the maturing and reproductive processes. Similar stimulation of growth was observed with the eggs of the snail *Limnaea ovata* and with frog larvae (*Rana esculenta*). In the case of tadpoles larger and stronger larvae were produced than in those fed hypophysis ext. Neither hypophysis nor adrenal exts. had any effect upon the metamorphosis of the tadpoles. The general favorable influence of small quantities of adrenal cortex upon the nutrition of animals is emphasized. W. A. P.

... Serological reactions as a probable cause of variations. M. F. GUYER. *Am. Nat.*

56, 80-96(1922).—"Since the metabolism of the actual living protoplasm centers, if not exclusively, at least principally, in the proteins the problems of metabolism, growth, reproduction and heredity become largely the problems of why and how a given kind of living protoplasm builds up proteins of its own specific type." The problems suggested by the foregoing paragraph are discussed in the light of modern biology and biochemistry. L. W. RIGGS

**Role of alkalinity of sea water in heterogeneous fertilizations.** ALPHONSE LABBÉ. *Compt. rend.* 174, 1199-1201(1922).—Eggs of *Halosydna gelatinosa* and sperm of *Diplasterias rubens* or of *Lepadogaster Gouanii* were used. Spermatozooids of Asterias and of fish were equally efficient. The addn. of 1.4 to 1.5 cc. 0.1 N NaOH to 100 cc. of sea water at a temp. of 10° increased 5-fold the percentage of eggs transformed to trochopheres. In higher concns. the development was retarded and was 0 at 1.65 cc. 0.1 N NaOH per 100 cc. of sea water. L. W. RIGGS

**Variation of the osmotic pressure of the blood of fresh water teleostean fishes, under the influence of an increasing salinity of the surrounding water.** PAUL PORTIER AND MARCEL DUVAL. *Compt. rend.* 174, 1366-8(1922).—The f. p. of fresh water is  $-0.02^{\circ}$  and that of the blood of the carp  $-0.49^{\circ}$ . These figures are changed to abs. osmotic pressures by multiplying by the factor 124, which gives 2.48 and 60.76 m., resp., as compared with the osmotic pressure of distd. water. Carp weighing 400 to 800 g. were placed from 3 to 5 hrs. in a tank contg. 13 l. of water progressively enriched by NaCl. On removal from the tank the f. p. of the blood was detd. to within 0.01°. The osmotic pressure of the blood increases as the NaCl of the surrounding water becomes more concd. but the increase of osmotic pressure of the blood is less rapid than is the increase of osmotic pressure of the NaCl soln. For concns. above 10 g. NaCl per l. the osmotic pressure of the water is greater than that of the blood. At 10 g. per l. the blood and saline water have the same osmotic pressures. Although the fish is incapable of maintaining its osmotic pressure at a const. level like mammals and birds, it shows a tendency toward such regulation. The wt. of the fish decreases as the salinity of the water increases up to concns. of 15 g. NaCl per l. Beyond this concn. the loss of wt. is less and the fish exhibits those conditions which rapidly end in death. L. W. RIGGS

**Constitution of the egg of trout (*Trutta fario*).** E. FAURÉ-FREMIET AND MILLE. H. GARRAULT. *Compt. rend.* 174, 1375-7(1922).—Freshly laid trout eggs contained H<sub>2</sub>O 58.5%, (N  $\times$  6.25) 29.81%, (fatty acids  $\times$  1.046) 9.16%, carbohydrates 0.34%, ash 1.25%, sum 99.06%. Vitellin (ichtulin) was obtained by grinding the fresh eggs with crystals of NaCl, filtering through cloth in a Buchner funnel and washing the residue with a little 8% NaCl soln. A pale yellow ropy viscous liquid contg. many drops of oil is obtained. The sepn. of vitellin is not complete but further extn. of the residue on the filter results in the introduction of impurities. The liquid is washed with Et<sub>2</sub>O and the vitellin may be pptd. by means of alc. or by diln. with 30 to 50 vols. of water. After washing with alc. and ether the vitellin appears as a white powder contg. N 14.28, P 0.57, ash 2.17, the yield being 24.8% of the eggs. Freshly pptd. vitellin is sol. in alkalis from which soln. it is pptd. by diln. or by cautious addition of acid. It is coagulated by heat and on acid hydrolysis does not yield any sol. reducing substances. Vitellin is more sol. in the presence of CaCl<sub>2</sub> than NaCl or KCl. The ether ext. contained about 10% glycerides, 8.2 phosphatides and 1.37 cholesterol. The glycerides appear to contain about 2 mol. of oleate to one of myristate with small amts. of other acids. The phosphatides appear to contain acids less satd. than oleic. The carbohydrate fraction was a reducing sugar calcd. as glucose. Glycogen was not identified. The ash is largely a Ca phosphate. L. W. RIGGS

**Feeding experiments on tadpoles and the significance of tryptophan.** W. KOLMER AND FERD. SCHEMINZKY. *Arch. ges. Physiol.* (Pflüger's) 193, 93-101(1922).—

Through feeding expts. utilizing various substances, it was shown that tryptophan is just as essential for tadpoles as for poikilothermic animals.

G. H. S.

**Effect of iodized protein bodies on the metamorphosis of frog larvae.** I. ABELIN. *Arch. ges. Physiol.* (Pflüger's) 193, 624-5(1922); cf. *C. A.* 15, 2312.—The constitution of the substance given is of more significance than the amt. of I present, or than the fact that protein as such is present. Iodized gelatin was without effect; iodized casein was active; as was also di-iodotyrosine and di-iodotyramine.

G. H. S.

**Carbon dioxide exhalation of air-breathing water insects.** W. V. BRUDDENBROCK AND G. V. ROHR. *Arch. ges. Physiol.* (Pflüger's) 194, 218-23(1922).—App. and methods are described for detg. the amt. of  $\text{CO}_2$  given out in the respiration of air-breathing water insects.

G. H. S.

**Constituents of Japanese common earth worm.** II. Y. MURAYAMA AND AOYAMA. *J. Chem. Soc. (Japan)* No. 484, 482-92(1922); cf. *C. A.* 15, 2312.—In contribution I, M. and A. obtained leucine and valine from an alc. ext. of the earth worm and tyrosine from a  $\text{H}_2\text{O}$  ext. In this, further analysis of the  $\text{H}_2\text{O}$  ext. is given. The same dried common earth worm, *Perichaeta communissima*, Goto and Hatai (*Lumbricus* Spencer), was used. By ordinary methods of sepn. of different amino acids and purine bases, the following amts. were isolated: xanthine 0.1%, epiguanine 0.163%, adenine 0.078%, guanidine 0.023%, lysine 0.250%, alanine 0.031%, valine 0.237%, leucine 0.464%, Ph alanine 0.025% and choline 0.004%. Histidine, arginine and glycine were notably absent.

S. T.

## 12—FOODS

W. D. BIGELOW AND A. E. STEVENSON

**William Frear.** R. N. BRACKETT. *J. Assoc. Official Agr. Chem.* 5, No. 4, iii-vi (1922).—Obituary.

E. H.

**Relation between the calorific values of foodstuffs, obtained by combustion and by calculation, and nutrition.** J. KÖNIG AND J. SCHNEIDERWIRTH. *Z. Nahr. Genussm.* 42, 3-23 (1921); cf. *C. A.* 16, 295.—The efficiency of a foodstuff cannot always be expressed as the difference between the amt. consumed and that excreted, whether this be expressed as heat values or as % of the 5 constituents—ash, fiber, protein, fat, and carbohydrates. Heat values obtained by bomb expts. agree in most cases with those calcd. from values assigned to each of the above-named constituents. The analysis of excreta as a means of detg. non-utilized food is complicated by the presence of considerable amts. of intestinal juices, etc. As a result of a large number of comparative analyses various suggestions are made for the modification and amplification of routine calcs. made in nutrition expts.

J. S. C. I.

**Determination of moisture in foodstuffs.** G. A. STUTTERHEIM. *Pharm. Weekblad* 59, 68-70(1922).—The app. proposed by Meihuizen for the estn. of moisture by use of a current of air dried over  $\text{H}_2\text{SO}_4$  (cf. Brit. pat. 114,620) gives satisfactory results only at a temp. of  $100^\circ$ . If the dried material be weighed while still warm, the correction of 3 mg. suggested is in many cases far too low, differences of 19 mg. being not uncommon.  $\text{H}_2\text{SO}_4$  desiccators are not satisfactory, as samples left overnight have been found to gain up to 15 mg. in wt.

J. S. C. I.

**Determination of eggs in alimentary pastes.** E. VAUTIER. *Mitt. Lebensm. Hyg.* 13, 63-6(1922).—The Federal ordinance of Switzerland, May 8, 1914, calls for 160 g. egg per kg. of semolina. Methods now used are based on the yolk content by detg. lecithin  $\text{P}_2\text{O}_5$ . A method for detn. of albumins is proposed. Mix 25 g. of finely ground paste with 250 cc. distd.  $\text{H}_2\text{O}$  in a large-neck flask until gummy, shake 30 min. by machine and filter, returning the first turbid soln. When the filtrate is clear place 200 cc. in

an 800-cc. beaker and add about 220 g.  $MgSO_4$ . Stir and let stand 1 hr. on the  $H_2O$ -bath and then boil 5 min. Filter with a pump on paper covered with calcium and washed infusorial earth, dry, remove paper and transfer to a Pt dish, dry at  $100^\circ$  and weigh. Loss in wt. on ignition is albumin. Corn. paste without egg gave 0.8-1.2%. Lab. products gave with no eggs (little milk) 1.1, 1 egg 1.3, 2 eggs 1.7 and 3 eggs 2.1%. This method should be useful in connection with lecithin  $P_2O_5$  to det. the whole egg content.

H. A. LEPPEL

Volumetric method for determining added water in milk. F. KOPATSCHEK. *Milchw. Zentr.* 51, 85-7(1922).—The method depends on the detn. of Cl and lactose, after removing albuminous matter with uranyl acetate. 20 cc. of milk is shaken with 30 cc. of uranyl acetate (1.57%) and 30 cc. of water, and immediately filtered. Part of the filtrate is used for the estn. of lactose in the polarimeter, and the Cl is estd. in 10 cc. by Mohr's method. The color change is sharper if 1.5 cc. of alc. is added. In using the results for the detection of added water a mean value is best obtained for  $L + 44 \times Cl$  for the district where the investigations are being carried out ( $L$  = lactose and  $Cl$  = chlorine in pts. per 1000). The % added water is then given by  $100[M - (L + 44 Cl)]/M$ , where  $M$  is the mean value for  $L + (44 \times Cl)$  for the district. It is claimed that this method will show water addns. of 5%.  
J. S. C. I.

The effect on the percentage composition of the milk of (a) variations in the daily volume and (b) variations in the nature of the diet. W. TAYLOR AND A. D. HUSBAND. *J. Agr. Sci.* 12, 111-124(1922).—Protein, casein, albumin and globulin, non-protein nitrogen, fat, lactose and ash were detd. The percentage compn. of the milk seems to be detd. by its rate of secretion. Protein, fat and ash vary inversely as the daily vol.; while the lactose varies indirectly. The fat varied the most and the inorg. elements the least. Lactose shows an inverse relationship to all the other constituents, particularly so in the case of milk. Diet has no direct influence on the compn., except in the case of non-protein N though it does have an indirect influence by reason of its effect on the daily vol. High-protein diet appears to stimulate the rate of secretion. It is suggested that the quantity of lactose elaborated by the mammary gland controls the daily vol. of the milk, and that, therefore, the rate of its elaboration controls the rate of milk secretion.

R. B. DEEMER

An attempt to obtain a catalasimetric index for appraising the hygienic value of milk. ANDRÉ BAZIN. *Bull. soc. pharm. Bordeaux* 60, 54-9(1922).—B. has detd. the rate of catalase formation in milk by measuring in a Denigès ureometer the amt. of  $O_2$  liberated from 10 cc. of  $H_2O_2$  soln. by 10 cc. of milk. Three hrs. after milking, this is found to be 0.6 to 0.7 cc. For milk kept under proper conditions and handled properly, the amt. should not exceed 1.5 to 2.0 cc. after 12 hrs. The rate of formation of catalase runs parallel with the increase in acidity for the first 17 hrs., after which the former increases the more rapidly. The catalasimetric index should prove a valuable factor in detg. the hygienic value of milk because it is a true criterion of bacterial contamination and because of the ease with which it can be detd.

A. G. DUMÉZ

Preservation of milk by small quantities of hydrogen peroxide. A. MÜLLER. *Milchw. Zentr.* 51, 25-9, 37-9, 49-53, 61-4(1922).—It was found most satisfactory to heat the milk to  $70-1^\circ$  for  $\frac{1}{2}$  hr. and to cool to  $15-20^\circ$  before adding the peroxide. Heating above this temp. even for a short period produced the taste characteristic of "cooked" milk. 0.15% of  $H_2O_2$  in milk could be tasted immediately after addn., but in 24 hrs. the taste disappeared. The taste of 1% peroxide disappeared after 48 hrs. Bacterial counts of treated milk (0.1%) were enormously reduced during the first 3-5 days, and had not regained the control figure at the 7th day. Milk treated with 0.1% of  $H_2O_2$  after pasteurization remained fresh for 3-4 times as long as milk pasteurized only. Dairy trials showed that there was considerable reinfestation of the pasteurized

milk during the cooling process. The use of rusty cans decreases the efficiency of the  $H_2O_2$  owing to the catalytic action of the rust. J. S. C. I.

**Cream formation.** O. RAHN. *Forsch. Geb. Milchw. Molkereiwes.* 1, 133-54(1921).

—There is no simple relation between the viscosity of milk and the rate of formation of cream; the latter is accelerated by the addn. of gelatin, peptone, or gum arabic to the milk and hindered by the addn. of Na silicate; sugar, in strong concn., has a slight retarding effect. The slow formation of cream in the case of milk which has been heated at 65° appears to be due to alteration in the fat globules and not to changes in the other constituents. If cream is sepd. from milk, the skimmed milk heated at 65°, cooled, and re-mixed with the cream, the latter "rises" at the same rate as in unheated milk. The addn. of gelatin or gum arabic to heated milk imparts to the latter the character of unheated milk as regards the "rising" of cream. While cream from heated milk is richer in fat than is that from unheated milk, cream from milk contg. gelatin or gum arabic has a lower fat content than has the cream from the same milk without any addn.

J. S. C. I.

**Formation of cream.** O. RAHN. *Forsch. Geb. Milchw. Molkereiwes.* 1, 213-33 (1921); cf. above.—Aggregations of fat globules in milk are broken up when the milk is heated, hence cream seps. more slowly in heated milk. Substances which accelerate the formation of cream increase the aggregation of the fat globules. The fat content of the cream from unheated milk is about 5.4% lower than that of cream from heated milk. It would appear that there is a colloidal membrane which accounts for the aggregation of fat globules in milk and that this colloid is destroyed by heat. When gelatin is added to milk, the cream contains a greater proportion of gelatin than does the skim milk, the protein seeming to condense on the fat globules. The fat globules in heated milk are not "weighted" by coagulated albumin, since the cream from heated milk is always richer in fat than the cream from unheated milk. J. S. C. I.

**Process of churning butter.** I. A surface-tension theory. O. RAHN. *Forsch. Geb. Milchw. Molkereiwes.* 1, 309-25(1921); cf. above.—The fat globules of milk are surrounded by a thin, viscous covering layer of a substance of low surface tension. The substance coagulates in air, forming a compact membrane. During churning this covering layer forms a froth which rises to the surface carrying with it the fat globules. The membranes, coagulated by exposure to air, are subsequently broken by the churning movement; frothing ceases, and the fat globules coalesce to form the small grape-like masses of butter. The film enclosing the fat globule is of the nature of a protein but is neither albumin nor casein. Butter formation takes place at all temps. up to 41°.

J. S. C. I.

**Formation of cream.** O. RAHN. *Kolloid-Z.* 30, 110-4(1922); cf. preceding abstracts.—The aggregates of fat globules in heated milk rise more slowly than those in unheated milk, while the single globules rise more rapidly in heated milk. The sepn. of cream in unheated milk is due almost entirely to the sepn. of aggregates of fat globules, while in heated milk it is due to the sepn. of individual globules and small aggregates. The larger the fat aggregates the more rapidly they rise. The slow formation of cream in heated milk is due to the slow rate of rising of the fat globules. The action of heat on milk is to disturb the formation of fat aggregates due to the destruction of the "stickiness" of the natural sheath of the fat globules. J. S. C. I.

**A tropical milk supply.** ALEXANDER BRUCE. *Analyst* 47, 288-94(1922).—Analyses are given of cow and of buffalo milk and of feeding stuffs used during the test.

E. H.

**Effect of cold storage on the carnosine content of muscle.** W. M. CLIFFORD. *Biochem. J.* 16, 341-343(1922).—Carnosine disappears in the cold storage of meat. It is now shown that by employing a method developed by the author for estg. car-



nosine (C. A. 15, 3856; 16, 1457), dependent upon the red color produced when the substance is diazotized, a test is obtained for distinguishing fresh from cold-storage meat. A sample of beef or veal contg. carnosine below 0.8% or of mutton or lamb below 0.3%, would not come from a freshly killed animal, but probably from a carcass which had been chilled in order to preserve it. If the amt. is as low as 0.3% in the case of beef, or 0.15% with mutton, the sample is 9-12 months old.

BENJAMIN HARROW

A contribution to the analytical study of the milks of the Montpon (Dordogne) region. G. ISSALY. *Bull. soc. pharm. Bordeaux* 60, 68-73(1922).—Analytical data show the compn. of the milks of the Montpon region and their application to the simplified mol. const. of Mathieu and Ferré (*Ann. fals.* 1914, No. 63, January). The original article must be consulted for details.

A. G. DUHRZ

The chemistry of wheat products. GEO. L. TELLER. *Natl. Miller* 27, No. 7, 38(1922).—A semipopular discussion of wheat products is given. A table shows the compn. of flour, germ, and bran from the same wheat and there is also one showing the compn. of American wheat, bran, and shorts. No one point alone will show the quality of a flour; it is necessary to know not only the gluten and the ash, but also the absorption and something more about the color of the flour and the quality of the bread made from it. The importance of each of these is discussed.

RUTH BUCHANAN

The ash test (for flour) and its value. S. J. LAWELLIN. *Natl. Miller* 27, No. 7, 35-36(1922).—Equipment and methods of detg. ash are discussed. Too much emphasis cannot be placed on the use of a *pyrometer* with an automatic control for the muffle. The value of the ash test to the miller is in the operation and control of his mill, to assist in making his mill mix, and as an indication of the quality and uniformity of his milling. The baker uses the ash as an indication of the grade of flour. The ash test is of importance but not in detg. the flour quality or value. Its greatest importance, outside of mill control, is when it is supplemented by a complete chem. analyses.

R. B.

The bleaching of flour. H. E. WEAVER. *Natl. Miller* 27, No. 7, 34(1922).—A summary is given of the bleaching of flour by means of  $N_2O_4$ , Cl and  $NCl_3$ , both from a legislative and technical standpoint.

RUTH BUCHANAN

The supposed poisonous qualities of the granary weevil, *Calendra granaria*. FLORANCE DEFIEL. *Am. J. Trop. Med.* 2, 199-211(1922).—The granary weevil contains no cantharidin, as has been assumed. There is no evidence that it is responsible for cases of poisonous flour.

G. H. S.

Disinfection of fruits and vegetables by bleaching powder. M. CHAMPION AND E. VANDEVELDE. *Bull. soc. chim. Belg.* 30, 124-9(1921).—Fruits and vegetables may be sterilized by immersion for 30 mins. in a 0.2% soln. of bleaching powder; *B. coli* and pathogenic organisms are destroyed, and in many cases the treated fruits are quite sterile. The treatment does not affect the taste or flavor of the fruits, etc., especially if they are rinsed subsequently with boiled water.

J. S. C. I.

Automatic equipment and chemical control (in the beverage industry). G. L. MONTGOMERY. *Chem. Met. Eng.* 27, 150-4(1922).—The Beechnut Packing Co.'s ginger-ale plant is described.

E. H.

The washing of apples used for cider. F. MARRE. *J. agr. prat.* 37, 444-5(1922).—Washing with  $H_2O$  removed the following quantities of material from 20 kg. of apples: solids (dried at  $100^\circ$ ) 7.24 g., total sugars 4.63 g., tannin 0.023 g., albuminoid and pectose substances 1.412 g., total acidity (as malic acid) 0.191 g., solids (dried on water bath) 7.258 g., ash 0.708 g.

R. B. DREMER

Quality of tin-plate and its influence on the quality of tinned foods, etc. H. SERGER. *Z. offenl. Chem.* 27, 133-9(1921).—During the last few years the quality of the tin-plate used for making containers for preserved foods, etc., has deteriorated considerably; the coating of tin on the plate is often less than 0.1 g. per sq. cm. and

"pinholes" are numerous. Where the latter exist there is more or less rapid attack of the iron plate and the contents of the tin are spoiled. It is suggested that each side of a tin-plate should have a coating of not less than 0.2 g. of tin per sq. cm. The presence of "pinholes" in the coating is readily detected by means of  $K_3Fe(CN)_6$ -gelatin reagent.  
J. C. S. I.

**Evaporating milk or other liquids.** C. R. MAREE. U. S. 1,420,641-50 (10 patents), June 27. The milk or other liquid undergoing evapn. is spread as a thin moving film on the inner surface of an evapg. drum which may be heated by a steam jacket.

**Butter-fat gage.** J. A. MEEKER. U. S. 1,421,524, July 4. The gage comprizes two adjustable pointers for assisting in reading the length of a column of butter-fat in the graduated neck of a test bottle. Cf. C. A. 15, 2680.

**Purification of honey.** MATSUZŌ IWAYA. Jap. 39,494, Aug. 9, 1921. Japanese acid clay 3-5% and colloidal soil (obtained by heating dried and powdered soil at 200-250° in a closed retort) 3-5% are added to honey of 20-25° Bé, and the mixt. is heated 70-75° and agitated. After 1-2 hrs. the liquid is sepd. and evapd. to a semi-solid *in vacuo*. 5-10% powdered soy bean, NaCl,  $Fe(OH)_3$ ,  $Fe_2O_3$ , a mixt. of them or animal charcoal may be added to the above. Cf. C. A. 16, 1285.

**Apparatus for dehydrating meat, fish, vegetables or similar materials.** O. Q. BECKWORTH and O. J. HOBSON. U. S. 1,420,679, June 27.

### 13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

**The business side of chemical manufacturing.** CHARLES WADSWORTH, 3rd. *Chem. Met. Eng.* 27, 101-4, 293-6(1922); cf. C. A. 16, 2186.—Accounting is discussed.  
E. H.

**The training of the industrial chemist.** GEO. W. WALKER. *J. Ind. Eng. Chem.* 14, 737(1922).  
E. J. C.

**Thickness and resistance of oil films in high-speed bearings.** G. STONEY, R. O. BOSWALL and J. MASSEY. *Engineering* 113, 249-50(1922).—An app. is described by means of which it is possible to det. the thickness of oil films in bearings and to discover in what way this thickness changes with variations in load, rubbing speed and viscosity.  
J. S. C. I.

**Mechanical lubricators.** A. B. SMITH. *Diesel Engine Users' Assoc.*, Feb. 10 (1922).—Numerous diagrams of lubricators are given, and their deficiencies and advantages discussed. The most difficult task of the lubricator is to deliver oil in small quantities against high pressure.  
J. S. C. I.

**Dielectric [breakdown] value of insulating oils.** R. M. FRIESE. *Wiss. Veröffentlich. Siemens-Konzern* 1, 41-55(1921).—Insulating oil, prepd. by the purification and fractional distn. of petroleum oil, has when perfectly dry a max. dielec. (breakdown) value of 230 kv. per cm., but this is considerably reduced by absorption of moisture from the surrounding air, e. g., in free contact with air of about 50% relative humidity, the value is reduced to about 50 kv. per cm. In a sample of oil contg. approx. 0.01% of water, the value was only 22 kv. per cm. The value of moist oil can be increased to 130-140 kv. per cm. by heating the oil below 120°, or by filtration.  
J. S. C. I.

**Extinguishing electric generator fires with carbon dioxide.** J. B. WHEELER. *Elec. World* 80, 165-7(1922).—To det. the saturation of air with  $CO_2$  gas that would not sustain combustion, observations were made of the action of various percentages of  $CO_2$  on a tallow candle.  $CO_2$  and air were mixed in a 19-l. glass bottle and then the candle, fastened to a wire, was lowered into the bottle.  $CO_2$  was detd. with an Orsat

app. Results are tabulated. Whereas with 19 % and more  $\text{CO}_2$  the candle was extinguished immediately, with 12 to 14% the flame would be maintained for several seconds. Tests on extinguishing fires in generator are described. C. G. F.

**Isopropyl alcohol.** D. H. GRANT AND C. O. JOHNS. *Am. J. Pharm.* **94**, 418-25 (1922).—Isopropyl alc. has become a commercial article in the U. S. It is produced solely as a by-product of the petroleum and natural-gas industry, and is made by absorbing olefin gases, contg. propylene, in  $\text{H}_2\text{SO}_4$  and hydrolyzing the resulting alkyl-sulfuric acids. The crude alc. is sepd. by distn. and purified by chem. treatment and rectification. Isopropyl alc. is sufficiently non-toxic to be safely employed in external and oral medication, at least. A variety of uses of the alc. as such are given, also its applications in the manuf. of fine org. chemicals and synthetics, in the prepn. of solid medicinal exts., plant principles, oleoresins, etc.; as a solvent for medicinal substances for external medication; in cosmetics; in chem. biological and medicinal labs.; in the nitrocellulose and cellulose acetate industry; as a resin solvent and as a precipitant. The availability of isopropyl alc. in sufficient quantity has made possible the prepn. and study of a large number of deriv. compds. hitherto unknown or existing only as lab. specimens. W. G. GAESSLER

**Danger of spontaneous ignition of benzaldehyde during transport.** O. GERHARDT. *Chem.-Ztg.* **45**, 664 (1921).—Owing to a faulty seam in 1 of 4 tin cans of BzH packed in a case with fine wood shavings, the surrounding packing became impregnated with BzH which was autoxidized to benzoic acid, whereby the temp. of the packing in the neighborhood of the leak was raised to  $52^\circ$ . It is recommended that kieselguhr, powdered fireclay or the like, should be used as packing for the transport of BzH. J. S. C. I.

**Heat insulation.** FRITZ HOYER. *Chem. App.* **9**, 57-8 (1922).—A general discussion of a few insulating materials. J. H. MOORE

**Control of corrosion by deactivation of water.** FRANK N. SPELLER. *J. Frank. Inst.* **193**, 515-42 (1922).—A comprehensive study of the present status of the prevention of the corrosion of iron and other metals in closed systems by deactivation and deaeration of the water. While cold water usually does not seriously attack pipes and tanks in the life of a building or pipe line, yet notable exceptions to this rule exist. In some cases partial deaeration can be applied economically to cold water when necessary. Sections are devoted to: external factors, compn. of material, relative rate of corrosion, protective coatings, dissolved  $\text{O}_2$  in water, O-removal by chem. means (deactivation) in the United States, European practice, results of removal of  $\text{O}_2$  by iron in service, deaeration by mechanical means, deaeration of hot water and of cold water, European practice in mechanical deaeration, combination of mechanical and chem. deaeration. Cf. C. A. **16**, 1118. JOSEPH S. HEPBURN

**Recovering vapors from gas mixtures.** C. L. VORESS AND V. C. CANTER. U. S. 1,420,613, June 20. In recovery of vapors such as gasoline,  $\text{C}_4\text{H}_{10}$  alc. or ether, a solid absorbent is used, e. g., charcoal or silica gel, and the charged absorbent is treated with steam for a time only sufficient to volatilize the major portion of the absorbed vapors and is afterward treated with denuded gas to displace residual condensed vapors.

**Extraction of carbonaceous substances.** H. PLAUSON. Can. 220,515, July 4, 1922. Materials capable of extn. with  $\text{SO}_2$  are treated with a concd. soln. of  $\text{SO}_2$  in acetone.

**Electrical resistance material.** F. EICHENBERGER. U. S. 1,420,980, June 27. A paste is formed of finely divided Si carbide,  $\text{CaCO}_3$ , Fe oxide and graphite, molded and embedded in sand and burned out of contact with air.

**Insulating cement.** A. S. EISENBAST AND W. L. JORDAN. U. S. 1,421,192, June 27. A heat insulating cement adapted for covering walls is formed of diatomaceous earth 80, clay 10 and starch 10%.

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

**Chlorination of municipal water supplies.** JOSEPH RACE. *J. State Med.* 30, 263-6(1922).—A history of the development of the chlorination of water supplies is given. Forms of Cl used are: (1) liquid Cl, (2) hypochlorite, and (3)  $\text{NH}_4\text{Cl}$ . "After-growths" develop as a secondary cycle with bleach and liquid Cl. At Denver, Colo., "aftergrowths" entirely disappeared when  $\text{NH}_4\text{Cl}$  was substituted. R. recommends chlorination for bacteriol. purification and the use of filters to remove turbidity, color, etc.

G. C. BAKER

**Twenty years' filtration practice at Albany, N. Y.** G. E. WILLCOMB. *Eng. News-Record* 88, 879(1922).—Four distinct steps in methods of treatment of water have been introduced: (1) slow sand filtration from 1899 to 1908; (2) double filtration in 1908; (3) introduction of Cl in 1909; and (4) coagulation followed by by-passing of the preliminary filter effluent around the slow sand units. The steps show a gradual change from slow sand to rapid sand filtration has taken place.

F. B.

**Standard specification for pressure water filters.** ANON. *Am. City* 26, 422 (1922); *Pub. Health Eng. Abstracts* (July 22, 1922).

G. C. BAKER

**Perforated pipe underdrains for Alpena water filters.** W. G. CLARK. *Eng. News-Record* 88, 1048(1922).

FRANK BACHMANN

**Hydraulics of dosing tanks and trickling filters.** E. F. SANDS. *Eng. News-Record* 89, 67-9(1922).

F. B.

**Aerators and copper sulfate for tastes and odors.** H. M. ELY. *Eng. News-Record* 89, 70-1(1922).—The water supply for Danville, Ill. taken from the Vermillion R. and impounded in 2 reservoirs contains tastes and odors during low flows due to algae growths. A group of fountain aerators was installed to augment action of  $\text{CuSO}_4$  for removing tastes and odors. The aerators have not been in use long enough to note their effect.

FRANK BACHMANN

**Rain water.** P. DE SORNAV. *Rev. agr. Maurice* 1, 78(1922).—Rain water in the tropics is richer in N than in the temperate zone. In Mauritius it contains from 2.14 to 4.11 mg.  $\text{SO}_4$ , 3.00 to 4.57 mg. Cl, and 1.45 to 1.70 mg. N per liter.

F. W. Z.

**Correlation of stream pollution criteria from studies of the Naugatuck and Housatonic rivers in Conn.** J. F. JACKSON. *Am. J. Pub. Health* 12, 124-33(1922); *Pub. Health Eng. Absts.* (April 15, 1922).—Chem. and bacteriol. analyses did not show a definite correlation between the appearance and the actual condition of the water, owing to varying character and form of suspended solids; acids and Cu salts effected the bacteriol. content. Owing to inhibiting effects of wastes the dissolved O and dissolved O-demand tests could not be used as indices of pollution. The diln. factor is discussed.

G. C. BAKER

**Some conclusions drawn from a survey of sewage treatment plants.** H. H. WAGENHALS. *U. S. Public Health Repts.* 37, 1505-18(1922).—Fifteen plants were surveyed including primary plain sedimentation, septic, hydrolytic and Imhoff tanks; fine screens; trickling, contact and intermittent filters; secondary sedimentation, and activated sludge. Imhoff tanks satisfactorily removed suspended matter, av. amounting to 59%. Biological O demand was reduced 42.5% and  $\text{KMnO}_4$  O consumed 36%. Foaming is not a serious difficulty and relief may be obtained by the withdrawal of sludge. Trickling filters preceded by Imhoff, hydrolytic and septic tanks gave satisfactory effluents. Omitting one clogged filter O consumed values fell between 7 and 19 p.p.m. and 5-day O-demand values between 4 and 20. Alky. to Me orange was greatly reduced. Contact beds gave good results but not equal to the trickling filters. Oxygen-consumed values were 11 and 18 and 5-day O-demand values were 20 and 37 for two plants.

Fine screens showed little, if any, accomplishment. Activated-sludge plants at San Marcos and Houston, Tex., gave excellent results. The effluent of the San Marcos plant contained 3 p.p.m. suspended matter, and O-consumed content of 8 and 5-day O demand of 16 with more than enough O in the form of dissolved O and nitrates to satisfy this demand. The plant at Sherman, Tex., did not give a highly purified effluent as night soil was being dumped into the sewers so close to the treatment plant that it reached the plant in almost unbroken condition. Utilization of sewage sludge as a fertilizer is discussed and expert supervision and chem. control of plants are recommended.

G. C. BAKER

The relation between gas evolved and the digestion of sewage in activated sludge. G. H. W. LUCAS. *Can. Chem. Met.* 6, 148-51(1922).—Carbonaceous matter of sewage is more easily oxidized than the nitrogenous. Variation in the percentage of  $\text{CO}_2$  and O before and after passing through the sewage is relatively small and becomes smaller as the vol. of air is increased; the N undergoes but little change. The presence of activated sludge does not accelerate the oxidation of raw sewage.

G. C. BAKER

Preliminary note on septic tank latrines in relation to hookworm disease. J. B. McVAIL. *Indian J. Med. Research* 9, 806-8(1922); *Pub. Health Eng. Absis.* (July 15, 1922).—The discharge from septic tank latrines in hookworm countries should not be used directly as fertilizer.

G. C. BAKER

Studies on the treatment and disposal of industrial wastes. I. The treatment and disposal of strawboard wastes. H. B. HOMMON. *U. S. Public Health Bull.* No. 97 (1919).—Exptl. studies made on the disposal of strawboard wastes included treatment by sedimentation, filtration, and the activated-sludge process. The wastes were sedimented 2-4 hrs. Chem. precipitants ( $\text{CaO}$ ,  $\text{Al}_2(\text{SO}_4)_3$ , and  $\text{FeSO}_4$ ) were added during certain periods of the tests. The settled wastes were filtered, screened cinders giving the best results. The activated-sludge process was tested in connection with further treatment of the waste but the degree of added purification with aeration was insufficient to warrant further study. The disposal of the sludge remains a problem; when partially dried it can possibly be used as fertilizer.

JULIAN H. LEWIS

Studies on the treatment and disposal of industrial wastes. III. The purification of tannery wastes. HARRY B. HOMMON. *U. S. Public Health Bull.* No. 100, 133 pp. (1919).—The processes of treatment recommended for tannery wastes as developed by 2 yrs. tests at a large tannery are, in general outline, as follows: treatment of the spent tan liquor with lime sludge from the unhairing vats, followed by about 24 hrs. quiescent sedimentation; mixt. of the supernatant liquid from this treatment with the remainder of the wastes and treatment of the combined wastes with  $\text{FeSO}_4$  at the rate of about 10 grains per gallon; sedimentation of the mixed wastes in a tank having sufficient capacity to permit 24 hrs. operation of the filters, and to provide for a minimum time of passage during the daytime of 4 hrs.; preliminary filtration of the settled liquors through cinder roughing filters at about 200,000 gallons per acre per day; sedimentation in tanks for about 1 hr. and secondary filtration through beds of coarse sand; addition of the sludge from the spent tan liquor treatment to the main sedimentation tank at frequent intervals and withdrawal of the sludge from the latter and from the secondary sedimentation tank to sludge drying beds as necessary; utilization of the dried sludge as fertilizer. Direct utilization of the liquid sludge to fertilize near-by land may be found more economical than the use of drying beds under certain conditions. The capacities and rates of operation of these various treatment devices will vary with the requirements of the individual case, especially as regards the quality of the final effluent necessary. An appendix is given containing the data for the design of a plant for the treatment of the wastes resulting from the tanning of 100 hides per day, under conditions that require a nonputrescible effluent but permit the discharge of considerable color. J. H. L.

**Poisoning from sewer gases.** W. KLEIN. *Deutsches Z. ges. gerichtl. Med.* 1, 228-41(1922).—Sewer gases owe their toxicity to the relatively high concn. in  $H_2S$ .

F. S. HAMMETT

**Ventilation and human efficiency.** LEONARD HILL. *Bull. Inst. Mining Met.* No. 205, 1-15(1921).—A discussion of the influence of the following factors on human efficiency: ventilation, the temp., humidity,  $CO_2$  content, dust content, and bacterial content of the atm. Both the simple kata and the elec. kata thermometers are described; and formulas are given for their use in ventilation studies. A recording kata thermometer is also described.

JOSEPH S. HEPBURN

**Ventilation and human efficiency.** LEONARD HILL. *Bull. Inst. Mining Met.* No. 206, 1-17(1921).—Discussion of Hill's paper (see preceding abstract) by Haldane, Hill, and others.

JOSEPH S. HEPBURN

**Experiments in air conditioning.** PHILIP DRINKER AND R. M. THOMSON. *J. Ind. Hyg.* 4, 63-9(1922).—By use of a portable air-treating machine contg. a motor-driven centrifugal pump for charging atomized water into a spray chamber, expts. were carried out to demonstrate its practicability in varying the relative humidity and temp. of rooms. With no other aid such as ventilation the relative humidity and temp. were rapidly varied at will. Such an app. is well adapted for instruction of students.

H. C. HAMILTON

**Determination of the value of certain soaps in disinfecting wall and floor surfaces.** J. R. CONOVER AND J. L. LAIRD. *Am. J. Public Health* 12, 602-5(1922).—A method of testing the action of a germicidal soap on surfaces is given. More probably pathogens are to be found on surfaces recently wetted than on those which have been dry for some time. The germicidal soaps tested did not destroy the test organisms in the length of time usually employed to wash surfaces by the usual procedure of employing soap and water followed by rinsing.

NATHAN VAN PATTEN

**Separating sludge, grease and other substances from unclean liquid mixtures.** C. W. SIECH. U. S. 1,416,899, May 23. Sewage, factory effluents or other liquids to be purified are forced against a head of trapped air, and skimming, sedimentation, sepn. and stratification are effected in an app. so that the sepd. products can be drawn off without obstructing the flow of liquid.

**Sewage disposal.** W. GAVETT. U. S. 1,420,250, June 20. Sewage is subjected during digestion to the action of the gas developed by the digestion which is maintained under pressure and utilized to drive liquid from the vessel in which the digestion is conducted.

**Apparatus for purifying sewage by sedimentation, filtration and aeration.** J. P. BALL. U. S. 1,421,891, July 4.

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

**Practical significance of the organic-carbon:nitrogen ratio in soils.** J. W. READ. *Soil Sci.* 12, 491-5(1922).—Sixteen of 27 soils studied contained less than 3% of org. matter, and the C : N ratio for these soils ranged from 4.51 to 9.00. The remaining 23 soils having above 3% org. matter showed a ratio of 6.32-10.74. The soil productivity could not be correlated with the organic-C : N ratio.

W. J. ROBBINS

**Recent methods for the examination of soils.** KORNIG, J. HASENBÄUMER. O. KLEINE-MÖLLHOFF AND M. L. PLONSKI. *Landw. Jahrb.* 56, 439-70(1921).—Atterberg's process for the examn. of soils being a very lengthy one, the following process is recommended as giving good results if an exact sepn. of the particles between 0.01 mm.

and 0.002 mm. and finer than 0.002 mm. is not required. After the earlier treatment prescribed in the Atterberg process the mixt. is allowed to stand for 1 hr. in the settling cylinder, the finer slime siphoned off, and the remainder dried and weighed, the wt. of the finer material being found by subtracting this percentage from 100. To det. the acid-sol. constituents of the soil, it is heated for 3 hrs. with HCl of sp. gr. 1.19 under a reflux condenser. The sol. silica in the residue is extd. with  $\text{Na}_2\text{CO}_3$  soln., and the residue from this extn. is treated with dil. HCl to remove Na salts before it is treated with concd.  $\text{H}_2\text{SO}_4$  and HF. The method of detg. the water in the soil by distg. it with high-boiling hydrocarbons gives incorrect results, only part of the water chemically combined in the clay and silicates being removed by this process. Solns. of Na and K chlorides act as strong solvents for the lime in base-exchanging silicates and in gypsum, but have only a slight solvent action on Ca carbonate, whereas  $\text{NH}_4\text{Cl}$  solns. act conversely to this. By using this principle it is possible to det. the Ca present as silicate and sulfate by extg. the soln. for 2 hrs. with 10% KCl soln. and detg. the lime and  $\text{SO}_4$  in the soln.; Ca present as carbonate is then detd. in the residue by digestion with 10%  $\text{NH}_4\text{Cl}$  for the same time. J. S. C. I.

**The colorimetric determination of soil nitrates in a colored water extract.** PAUL EMMERSON. *Soil Sci.* 12, 413-7(1921).—In detg.  $\text{NO}_3$  by the phenoldisulfonic acid method in soil exts. colored by sol. org. matter  $\text{Al}(\text{OH})_3$  will quickly decolorize the soln. The  $\text{Al}(\text{OH})_3$  is prepd. by dissolving 125 g. of K or  $\text{NH}_4$  alum in 1 l. of  $\text{H}_2\text{O}$ . Sufficient  $\text{NH}_4\text{OH}$  is added to turn red litmus blue and the ppt. washed free of  $\text{NH}_4\text{OH}$  by decantation. The amt. of  $\text{Al}(\text{OH})_3$  necessary is detd. by comparison. Pptd.  $\text{CaCO}_3$  must be used as a flocculation agent to secure rapid results on a fine-grained soil. The method is accurate and exceedingly rapid. W. J. ROBBINS

**The use of silica crucibles for the determination of potassium in soils.** J. S. JONES and J. C. REEDER. *Soil Sci.* 12, 419-32(1921).—An electric muffle furnace and silica crucibles of the ordinary shapes used for ignitions can be used for the fusions necessary for K detns. provided certain limits of temp. are observed. To insure perfect fusions the furnace must reach a temp. of  $812^\circ$  and to avoid the loss of K by volatilization it must not exceed  $855^\circ$ . A thermocouple connected to a millivoltmeter makes a satisfactory temp. indicator. The sacrifice in accuracy is unappreciable for practical purposes. Fusions of soil for K in silica crucibles of the J. Lawrence Smith type heated with gasoline gas were never perfect. When heated in an elec. furnace of special design they were perfect and careful regulation of the temp. was not essential. W. J. ROBBINS

**An improved method for the determination of humus by oxidation with chromic acid.** A. GEBRING. *Z. anal. Chem.* 61, 273-8(1922).—The chromic acid oxidation method is modified to conform to a simplified form of the procedure for the detn. of C in steel by the wet method. 1-10 g. of soil (depending upon the humus content) is introduced into the usual distn. flask, 20 cc.  $\text{H}_2\text{O}$  is added, and finally, with caution, 30 cc. concd.  $\text{H}_2\text{SO}_4$ . The soil  $\text{CO}_2$  is eliminated by leading through the closed app. a stream of  $\text{CO}_2$ -free air. When the process is completed, the flask is connected to the potash absorption app. through a combustion tube contg.  $\text{CuO}$ ,  $\text{PbCrO}_4$  and reduced Cu spirals, and 8 g.  $\text{K}_2\text{Cr}_2\text{O}_7$  is added to the flask. The reaction mass is heated slowly and boiled for 1 hr., while a stream of  $\text{CO}_2$ -free air is conducted through the app. By this method any volatile products escaping oxidation in the primary reaction are completely oxidized in the combustion tube. Long connections or wash bottles between the flask and combustion tube should be eliminated as they favor condensation of unoxidized volatile compds. With soils of a wide range of humus content the method gives results checking very closely with those obtained by elementary analyses. P. R. D.

**The effect of gypsum on soil reactions.** L. W. ERDMAN. *Soil Sci.* 12, 433-48

(1922).—Pot expts. in which gypsum was added in amts. from 100–200 lbs. per A. to an acid soil, a neutral soil, and a basic soil did not increase nor correct the acidity as shown by the Tacke lime-requirement method. At the rate of 100, 200, and 500 lbs. per A. it did not affect the  $p_H$  of the soil; 1000 or 2000 lbs. per A. increased the  $p_H$  0.21 and 0.28, resp., in an acid soil, 0.14 and 0.27 in a neutral soil and 0.09 and 0.12 in a basic soil. Gypsum added at the rate of 500 lbs. per A. to a neutral soil made to vary in degrees of acidity by the addition of HCl and  $\text{CaCO}_3$  did not affect the  $p_H$  or the lime requirement of the soil.

W. J. ROBBINS

The lime requirement of soil and plant. THOS. D. HALL. *J. Dept. Agr. Union So. Africa* 4, 141–52 (1922).—Review and discussion of the physical chem. and biological changes brought about in the soil by the addn. of lime. A bibliography is included.

F. A. BARKER

Soil acidity and its effect on germinating plants. OTTO LEMMERMAN AND L. FRESSENIUS. *Z. Pflanz. Düng. [A]* 1, 12–32 (1922); cf. *C. A.* 16, 136.—Three types of soil acidity may be distinguished, namely, the actual acidity of the soil moisture due to the presence of acids, the latent acidity developed in the presence of solns. of neutral salts due to base exchange whereby salts of Fe and Al appear in the soil ext. and produce acidity by hydrolysis, and the latent acidity developed in the presence of salts of weak acids and strong bases where the base is absorbed by the soil colloids and the acid remains in the ext. The greatest acidity is found in the latter case and is not considered as of importance from a plant physiol. point of view. The 3 types of acidity for a no. of soils as measured by the titratable acidity and by the  $p_H$  were compared. While the results show a general agreement, the order of acidity is not quite consistent between the 3 series. Expts. with seedlings grown in sand cultures with the addn. of varying amts. of  $\text{H}_2\text{SO}_4$  in the water supplied show that cereals have differing toleration. Oats showed the greatest toleration of acidity, while wheat was the most sensitive. In the case of oats, a concn. of 0.05% of  $\text{H}_2\text{SO}_4$  was required to produce injury. The effect on the titratable latent acidity of the soil ext. of the previous addn. of varying amts. of  $\text{H}_2\text{SO}_4$  is shown by curves giving the relation between the amt. of  $\text{H}_2\text{SO}_4$  added and the titratable latent acidity of the soil ext. The curves for soils treated with Na acetate show higher acidities than those for soils treated with KCl. In the case of the KCl series, the amt. of  $\text{H}_2\text{SO}_4$  required to produce a titratable acidity in the ext. sufficient to cause injury (as shown by the sand culture expts.) gives an expression for the amt. of added acid which will produce harmful effects on plant growth. Results obtained with Na acetate and similar salts are not regarded as trustworthy criteria as to the acidity of the soil for plant physiol. purposes. From the differing tolerations of plants to acidity, the acceptance of any particular degree of acidity, measured as  $p_H$ , as critical is not to be recommended. Soil acidity must be considered in relation with the fertilizer treatment. Soils may have little active acidity, but marked latent acidity. With such soils no injurious effect due to acidity is observable unless dressings of salts such as KCl are given.

J. C. S.

Factors in the development of soil acidity. J. KÖNIG, J. HASENBÄUMER AND E. KRÖGER. *Z. Pflanz. Düng. [A]* 1, 3–12 (1922).—Estns. of the  $p_H$  of soil moisture were made to det. the effect of different soil dressings, the effect of the growth of individual species of plants with varying fertilizer treatment, and the effect of different species of plants on soil acidity. The expts. were carried out in Zn pots. Even without the addn. of any dressing there was a slight increase in acidity after 8 months, probably owing to defective aeration. Slight increases of acidity were observed as the result of normal applications of superphosphate, K salts, and  $\text{NH}_4$  salts.  $\text{NaNO}_3$ , "nitrolime," and basic slag had little effect, while Ca carbonate decreased the soil acidity. Similar results were obtained when the soil carried a crop of oats. In the expts. with



different crops, peas, lupines, and buckwheat produced a slight increase in acidity, while maize, grass, clover, and mustard gave slight decreases. These results are in agreement with observations on the acidities of the root sap of the plants used.

J. C. S.

**The oxidation of sulfur by soil microorganisms.** I. J. G. LIPMAN, S. A. WAKSMAN AND J. S. JOFFE. *Soil Sci.* 12, 475-89(1922).—A liquid medium contg. mineral salts, elemental S and  $\text{Ca}_3(\text{PO}_4)_2$ , with and without dextrose was inoculated with a suspension of a compost in which S oxidation was occurring. The  $p_{\text{H}}$  of the medium was 6.0-6.2. The presence of dextrose interfered with the oxidation of the S. The  $p_{\text{H}}$  of the medium was lowered to as low as 1.2. The sol.  $\text{PO}_4$  and  $\text{SO}_4$  increased. The S-oxidizing organism was isolated in pure culture by continued transfer, by diln., and by using media of high acidity. It could not be grown on solid media. Expts. in liquid media with this bacterium in pure culture showed that there occurred first a rapid increase in acidity accompanied by an accumulation of sol.  $\text{SO}_4$ . The insol.  $\text{PO}_4$  was then made sol. by the  $\text{H}_2\text{SO}_4$  produced. This change was accompanied by a decrease in sol.  $\text{SO}_4$  and a stationary phase in the acidity. As soon as all insol.  $\text{PO}_4$  was used up the acidity increased rapidly. In 12 days 81.7% of the insol.  $\text{PO}_4$  was dissolved and in 15 days 93.9%. With media of initial  $p_{\text{H}}$  from 2.0 to 6.5 best growth was obtained at  $p_{\text{H}}$  2.0-2.8. A brief description of the bacterium is given.

W. J. ROBBINS

**Preliminary note on the microbiology of the soil and the possible existence therein of invisible germs.** GIACONTO ROSSI. *Soil Sci.* 12, 409-12(1921).—A decanted ext. of fresh soil was filtered through an aseptic Chamberland filter into flasks contg. sterile culture media. After incubation the culture liquid was tested for products which might be formed by bacterial action. No evidence of indole production or of the formation of  $\text{NO}_2$  was found.

W. J. ROBBINS

**The citric solubility of mineral phosphates.** J. F. TOCHER. *J. Agr. Sci.* 12, 125-143(1922).—The citric soly. of mineral phosphates was studied at "room" temp. over a period of 30 min. agitation, with the following variations from the official (English) procedure: (1) varying diln., the quantities of acid (citric) and mineral phosphates being const.; (2) varying concn. of acid, the vol. of liquid and wt. of mineral phosphates being constant; (3) varying amts. of phosphate fertilizer, the vol. of the liquid and the concn. of acid being constant. The soly. of  $\text{CaHPO}_4$  in dil. HCl also was detd. From data thus secured it is evident that citric soly., if applied to fertilizers (so-called mixed goods) may in a certain degree be a measure of (a) fineness of grinding, but it seems necessary also to postulate similarity of compn. in comparing degree of fineness in practice, (b) the presence of alkaline substances in fertilizers approx. of the same compn. and ground to the same degree of fineness, (c) the presence or absence of F as well as alkaline substances in slags and (d) the differences in the constitution of the phosphatic compds. in finely ground fertilizers contg. approx. the same proportions of extraneous substances. It is proposed that the practical valuation of fertilizers be based on the total  $\text{P}_2\text{O}_5$  content, degree of fineness, and freedom from injurious substances inhibiting plant growth. The effect of using different kinds of phosphatic fertilizers on yield of turnip crops, when the same amt. of fertilizers, expressed as  $\text{Ca}_3(\text{PO}_4)_2$ , is applied in each case, forms the subject of a sep. communication.

R. B. DEEMER

**Increasing the efficiency of crude calcium cyanamide.** M. POPP. *Deut. Landw. Presse* 1920, [90] 617; *Biedermann's Zentr.* 50, 216-20(1921).—The fertilizing effect of crude Ca cyanamide is improved by admixture with the soil-disinfectant known as "Humus-Carbolineum," prepd. from lignite (*Biedermann's Zentr.* 49, 88(1920)). Details are given of field-trials with oats and potatoes.

J. S. C. I.

**Inoculated legumes as nitrogenous fertilizers.** P. E. BROWN AND J. H. STALLINGS. *Soil Sci.* 12, 365-407(1921).—Clover and alfalfa were grown in sterilized or unsterilized

soil in pots. Part of the pots were inoculated with *N*-fixing bacteria. The crop was harvested two weeks before blooming, when the blooms appeared, at full bloom, or when mature. The *N* content of the tops and the roots was detd. by the Kjeldahl method. From 12 to 25 cg. of *N* was fixed per plant by clover and alfalfa on untreated soils. On the av. 27% of the total plant *N* was in the roots of clover at maturity under natural soil conditions, while with alfalfa 46% of the total *N* was in the roots. With clover there was a greater fixation of *N* on the poorer soil while with alfalfa the greater fixation was on the better soil. With clover and alfalfa all the *N* in the tops and some of that in the roots came from the air. When clover and alfalfa are grown and the hay crops removed there may be some gain in *N* in the soil, the amt. of increase varying with the legume, soil type, inoculation, and general growth conditions. W. J. R.

**Carbon dioxide as a plant food.** O. LEMMERMAN. *Mitt. deuts. Landw. Ges.* 51, 696(1921); *Biedermann's Zentr.* 50, 299-304(1921).—Expts. undertaken to test the theory that plants are benefited by the  $\text{CO}_2$  produced by the decompn. of dung and of green manures in the soil are described. Plants grown in soil heavily fertilized with artificial fertilizers were not improved by treatment with green manures, with dung (ploughed in or as top-dressing), or with  $\text{CO}_2$ . Plants grown in pots standing over recently dunged land showed no improvement over those in similar pots standing on unfertilized land. Analysis of air drawn through a sample of soil mixed with decomposing org. fertilizers showed that the rate of production of  $\text{CO}_2$  in the case of dung averaged 0.008 g.  $\text{CO}_2$  per 100 g. of dung per day. The air immediately in contact with the surface of a dunged soil showed no increased content of  $\text{CO}_2$ . J. S. C. I.

**Carbon dioxide and plant growth.** BORNEMANN. *Mitt. deut. Landw. Ges.* 1920; *Biedermann's Zentr.* 50, 296-9(1921).—The increased fertility of dunged soil may, in part, be due to the resulting increase in the  $\text{CO}_2$  content of the soil atm. Plants grown in frames were treated with  $\text{CO}_2$  for 10 hrs. daily each plant having a sep. delivery of  $\text{CO}_2$  round its roots. Relative increases of 40% and upwards were obtained with peas, potatoes, oats, and onions. Smaller increases were obtained with barley and kohlrabi. J. S. C. I.

**Supplementary list of artificial fertilizers registered at the office of the Director of Agriculture under the Fertilizers Act 1915 (No. 2652).** P. RANKIN SCOTT. *J. Dept. Agr. Victoria* 18, 702-3(1920). F. A. BARKER

**Experiments with common rock salt. I. Effect on asparagus. II. Eradication of weeds and clearing of roadsides with salt. III. After-effects of salt.** W. RUDOLFS. *Soil Sci.* 12, 449-74(1922).—Expts. with a top-dressing of  $\text{NaCl}$  in addition to manure were made on 2- and 11-yr.-old asparagus plants. Common rock salt at the rate of 150, 300, and 500 lbs. per A. was used. Observations were made on the two yrs. of cutting and 1 year of counting and measuring the plants produced. For the 2-year-old plants the salt increased the av. total length of plants 21.1 to 38.7%, the number of stems 2.9 to 26.8% and the av. wt. of stalks per plant the following yr. 5.3 to 17.1%. Similar results were obtained with the older plants. The increase is mainly in the lower grades. Expts. with  $\text{NaCl}$  for killing weeds and brush along roadsides were conducted on 2 different soil types in 1919 and 1920. Eight tons per A. of  $\text{NaCl}$  will kill all vegetation except asparagus. As a rule 5-6 tons is effective if applications are made on a rainy day or when rain occurs within a few days. 3-4 T. are not sufficient to kill deep rooted plants. The effects of 3-3.5 tons are imperceptible. With 2-2.5 tons a fertilizing action seems to take place. W. J. ROBBINS

**A note on soil sterilization for tomatoes.** T. PARKER, A. W. LONG AND J. S. MITCHELL. *Bull. Bur. Bio-Tech.* No. 5, 134-42(1922).—With a view to conserving helpful and destroying harmful bacteria tomatoes were grown on (A) untreated soil, (B) soil treated with dichlorocresol and cresol soap emulsion, (C) with dichloro-

cregol and basic slag (*D*) with Na *N*-chloro-*p*-toluenesulfonamide, (*E*) with cresylic acid soap emulsion. No preliminary examn. of soil population was made. The yield of fruit was in the order  $A > C > B > D > E$ . The roots in *A* were cankered; the others were healthy but *D* and *E* were stunted. Soil sterilization must be carried out scientifically with previous knowledge of the soil bacteria and with the correct chemical at the right concn.

F. L. SEYMOUR-JONES

**Bordeaux mixture.** Should it be acid or alkaline? F. DE CASTELLA. *J. Dept. Agr. Victoria* 15, 749-54(1920).—Alk. Bordeaux is superior to acid or neutral Bordeaux since the protecting reserve of Cu is far more lasting and less liable to removal by rain. Casein may also be added.

F. A. BARKER

**Chloropicrin as an insecticide, especially for combating the grain-weevil (*Calandra granaria*).** 1. WILLE. *Z. angew. Entom.* 7, 296-310(1921).—Chloropicrin vapor at a concn. of 30 cc. per cu. m. effectively kills the grain-weevil in 6 hrs. For large stacks a concn. of 40 cc. per cu. m. for 24 hrs. is necessary. Workers can be protected by a leather gas mask charged with a material of high absorption-capacity. Treated grain loses a little in germinating power, but nutritive value and suitability for baking are not affected. Texture and color do not suffer. The chloropicrin vapor has completely disappeared 6 hrs. after treatment. Moths, bugs, caterpillars, etc., and also spores of wheat smut can be destroyed by chloropicrin.

J. S. C. I.

**The uses of tobacco waste.** B. J. SMIT. *J. Dept. Agr. Union So. Africa* 4, 267-71 (1922).—Tobacco considered solely as a fertilizer would at the present time be worth less than 1 d. per lb. During the process of manuf. of tobacco ext. by extg. the nicotine with hot  $H_2O$ , most of the fertilizer constituents are removed and the residue is of very little value as a fertilizer.

F. A. BARKER

**Nicotine dust for control of the striped cucumber beetle.** W. H. WHITE. U. S. Dept. Agr., *Circ.* 224, 1-8(1922).—Young cucumbers, melons and related crops may be protected from the ravages of the striped cucumber beetle by dusting with a mixt. contg. 72% kaolin, 24% lime and 4% nicotine sulfate. The dust acts as a repellent as well as a contact insecticide.

W. H. ROSS

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The rate of ascent of liquids through granular media (HACKETT) 2.

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**Fertilizer.** H. A. WEBSTER. U. S. 1,420,596, June 20. Manure or similar material is treated with acid phosphate to fix the  $NH_4$  present and is then treated with  $CaCO_3$  to generate heat and destroy weed seeds present and evap.  $H_2O$ . Cottonseed meal, blood, tankage or other fertilizers may be added.

**Apparatus for cooking fish meal for fertilizer.** E. T. MEAKIN. U. S. 1,421,283, June 27.

**Insecticide.** H. H. DOW. U. S. 1,420,978, June 27. Mg arsenate is formed from  $H_3AsO_4$  and an excess of  $Mg(OH)_2$ , which remains in the product (a fine dry powder). cf. C. A. 1 6, 2569.

## 16—THE FERMENTATION INDUSTRIES

C. N. FREY

**Determination of the yield of extract obtainable from the raw materials (malt) of the fermentation industries.** C. CHABOT AND M. H. VAN LAER. *Bull. soc. chim. Belg.* 30, 253-7(1921).—The conventional method (German Congress method) of detg. the ext. yield of malt gives useful comparative values, but the yields thus found in the lab. are often greatly exceeded in practice. On the basis of expts. described the authors recommend that for the detn. of the max. yield of ext.

obtainable from a malt a very fine grist should be used, the mash should be kept at 45° for 4 hrs. for peptonization, and  $\frac{1}{2}$ — $\frac{3}{4}$  of the alky. of the malt to methyl orange should be neutralized. If the mash is rendered quite neutral to methyl orange, still higher results may be obtained, but this is not recommended, as saccharification is seriously retarded.

J. S. C. I.

The preparation of protein for feeding purposes through yeast production. H. CLAASSEN. *Deut. Zuckerind.* 46, 94(1921).—Wohl and Scherdel (*C. A.* 16, 1829) have shown that yeast, in order to produce protein from inorg. sources, must be well supplied with org. N. Beet molasses should, therefore, be an excellent raw material for such a process.

F. W. ZERBAN

Report on distilled liquors. J. I. PALMORE. Wash., D. C. *J. Assoc. Official Agr. Chém.* 4, 465-6(1921).—Aldehyde-free EtOH (one sample 50% and one 95%) supersatd. with CO<sub>2</sub> was stored in sealed glass bottles in a refrigerator for 2½ years. Neither soln. showed appreciable formation of aldehyde by the sulfite-fuchsin test at the end of that time. 95% EtOH keeps freer of aldehydes under these conditions than 50% EtOH.

A. R. LAMB

Fermentation of wines. FRIEDRICH SAUER. *Suedent. Apoth.-Ztg.* 62, 238-9 (1921).—Wine musts can be fermented much more rapidly aerobically than anaerobically and without detracting from their value. A mixt. was prepd. of dried crabapples 300 g., NH<sub>4</sub>Cl 6 g., H<sub>2</sub>O sufficient to make 15 l. To this was added sufficient sugar to make the content exactly 30%. The mixt. was then seeded with Tokay yeast. A 10-l. flask was filled completely and the air excluded, and another was half filled and allowed to remain open to the air. Fermentation was allowed to proceed at 15°, the partly filled flask being shaken occasionally. Fermentation was not completed in the flask in which the air was excluded until the end of 8 weeks, whereas it took only 14 days in the open flask. The flavor and bouquet were the same in both cases, but they developed more rapidly in the wine prepd. aerobically.

A. G. DUMÉZ.

Tartaric acid and the abnormal wines of 1921. FONZES-DIACON. *Prog. agr. vil.* 77, 610-11(1922); cf. *C. A.* 15, 3362.—In the case of a wine in equil., *i. e.*, satd. with cream of tartar, but contg. an excess of K, the addition of citric acid merely increases the acidity by the amt. added; the addition of tartaric acid likewise raises the acidity as well as the tartaric acid content, modifying the compn. in a way to favor preservation. Only with the addition of K is further bitartrate pptd., and this is less in amt. than is proportional to the K added, leaving a further excess of the latter in soln.

P. R. DAWSON

Oxalic acid turbidity [in beers] and related problems. K. GEYS. *Z. ges. Brauw.* 1922, 2-5, 9-11.—The origin of the Ca oxalate crystals occasionally observed in beers (cf. Will, *C. A.* 5, 754; 9, 2964) has been investigated by Bau, who has worked out a method for detg. minute quantities of oxalic acid in brewing materials and products (*C. A.* 12, 2037). G. observed that Ca oxalate very frequently seps. from beers recovered from the yeast presses although the amt. present is usually less than in beers taken directly from the vats, *e. g.*, an 8% beer from the vats contained 32 mg. of Ca oxalate per l. as compared with 24 mg. in the beer recovered from the yeast. Beer recovered from the yeast has, as a rule, an abnormally low acidity, *e. g.*, in the case cited above  $p_H = 5.73$  as compared with  $p_H = 4.46$  for the corresponding beer from the vat, and it is concluded that this low acidity favors the sepn. of Ca oxalate and accounts for the frequent appearance of crystals of this salt in beer from the yeast presses. The observations recorded by Will (*loc. cit.*) confirm the conclusion that low acidity is the important factor in detg. the sepn. of oxalate crystals in beers.

J. S. C. I.

A wild yeast which causes turbidity in beer. H. CHRISTOPH. *Z. ges. Brauw.* 1921, 119-21, 127-30, 135-7, 147-9, 153-4.—The characters are described of a small-

celled bottom-fermentation wild yeast which caused turbidity in 8% bottle beer. The cells were 8 by  $5\mu$  in size and remained suspended for long periods, the yeast being of the powdery or non-agglomerating type. The yeast sporulated readily, producing 2 or 4 spores per cell, and in many cases fusion of two spores was observed to precede germination.

J. S. C. I.

The isolation of bacteria from beer deposits. P. HAMPSHIRE. *Bull. Bur. Bio-Tech.* No. 5, 128-31 (1922).—The usual culture media are unsuitable for the growth of typical beer bacteria, as these grow under almost anaërobic conditions. Under aerobic conditions many grow feebly and rapidly die. Trials with ordinary wort agar at  $p_H$  3.5-8.0 were unsuccessful. A suitable medium is prepd. by shaking 100 g. yeast with 500 cc.  $H_2O$  plus a few drops of toluene or chloroform. This is incubated 48 hrs. to allow autolysis to take place and the clear soln. is then poured off. 500 cc. wort are incubated with yeast and fermented 24-36 hrs. The two solns. are mixed; 1.5% agar is added, and the whole steamed and filtered. The  $p_H$  is about 4.5; adjustment to  $p_H$  4.0 results in the production of smaller yeast colonies. A small amt. of EtOH should be aseptically added to the melted medium immediately before pouring into the plates. Surface inoculations are made and the incubation is carried out in an atm. of  $CO_2$ . A vacuum desiccator contg. carbonate and acid is suitable. Attempts to differentiate between the various yeasts and bacteria by incorporating suitable indicators with the melted medium were unsuccessful.

F. L. SHYMOUR-JONES

Determination of carbon dioxide in beer by precipitation. MACHELIDT, Z. *ges. Brauw.* 1921, 180-1.—The method, as applied to beer in bottles of  $1/4$ -l. capacity, is as follows: Before opening, the bottle is chilled and weighed. Immediately after opening, 10 cc. of 25%  $NH_3$  soln. is introduced, and after the bottle has been closed and inverted several times to mix the contents it is emptied into a beaker and weighed empty. The ammoniacal sample is treated with 4 or 6 cc. (for 8% or 12% beers, resp.) of "magnesia mixt.," and after the pptn. of phosphate is complete the ppt. is filtered off and washed once with 60 cc. of 2.5%  $NH_3$ . The filtrate and washings are together treated with 15 cc., or, if necessary, 20 cc., of  $CaCl_2$  soln. (contg. 550 g. of  $CaCl_2 \cdot 6H_2O$  per l.) and heated, preferably to boiling, for a few minutes. The ppt. is collected, washed with boiling water, ignited, and weighed as lime. Unnecessary excess of reagents (magnesia mixt.,  $NH_3$ ,  $CaCl_2$ ) should be avoided. In operating on draught beers, about  $1/2$  l. of the beer is run slowly through a glass tube into 20 cc. of  $NH_3$  soln. contained in a bottle, which is weighed before and after the introduction of the beer, and emptied into a beaker as above after the contents have been mixed.

J. S. C. I.

Determination of extract in barley and calculation of the loss of extract in malting. L. HEINTZ. Z. *ges. Brauw.* 1921, 137-9, 149, 154-6.—A modification of the German Congress method for detg. ext. in malt is proposed for detg. the ext. in barley. 25 g. of finely ground barley and 25 g. of a finely ground malt are mashed-in with 200 cc. of water at  $52^\circ$  and maintained for 1 hr. in a water-bath at this temp. The temp. of the bath is then raised to  $72^\circ$  in 10 mins., and after addn. of 100 cc. of water at  $70^\circ$ , the mash is kept at this temp. for 1 hr. and then cooled and treated as in the Congress method, allowance being made for the ext. obtained from the malt. The results are lower than those obtained by some other methods, but form a suitable basis for valuation and for the control of malting operations.

J. S. C. I.

Rapid polarimetric method of determining tannin in hops. A. R. LING AND D. R. NANJ. *J. Inst. Brewing* 27, 310-3 (1921).—A modification of Chapman's method (C. A. 2, 1477) is proposed, in which the amt. of cinchonine tannate ppt. is calcd. from the decrease in the optical rotatory power of the cinchonine sulfate soln. as the result of the pptn. Ten g. of hops is extd. for 2 hrs. on a water bath and made up to 508 cc. as described by Chapman, and 100 cc. of the filtered liquid is evapd. to somewhat less

than one-half and treated with 50 cc. of an approx. 1% cinchonine sulfate soln., the exact titer of which has been detd. from its rotatory power by use of Landolt's value  $[\alpha]_D = 170.3^\circ$ . A quartz compensation polarimeter with Ventzke scale may be used, with the factor 0.3459 for conversion to angular degrees and Na light. A strictly 1% soln. of cinchonine sulfate, corresponding to 0.8145 g. of cinchonine base per 100 cc., should read  $4.92^\circ$  V. in a 100-mm. tube. By subtracting the corresponding value for the soln. after pptn., the amt. of base pptd., and therefore of tannin present, may be calcd. The results cited agree satisfactorily with those obtained gravimetrically.

J. S. C. I.

**Application of the Zeiss immersion refractometer to malt analysis.** K. GRYS. *Z. ges. Brauw.* 1921, 106-10.—Expts. extending over several years showed that in detg. the ext. in malt (by the German Congress method), where worts ranging from  $8^\circ$  to  $8.8^\circ$  Balling are obtained, the ext. content of the worts may be detd. with sufficient accuracy by means of the Zeiss immersion refractometer. The refractometer reading at  $17.5^\circ$  (corrected for the water reading at the same temp.) is divided by a factor which varies from 3.945 for a corrected refractometer reading of 32 scale divisions, to 3.960 for a reading of 35 divisions. Over this range the variation of the factor with the corrected refractometer readings is practically linear. The ext. contents of worts found in this way agree closely with the values detd. pycnometrically; differences of 0.03-0.04% Balling are very rare. The adjustment of the wort temp. to  $17.5^\circ$  for the refractometric reading must be made with great care, and the room temp. should not differ by more than  $1^\circ$  from this standard. Cf. Mohr, *Wochschr. Brau.* 23, 136-40 (1906).

J. S. C. I.

**Malts produced by the process involving resting periods in presence of carbon dioxide.** H. LÜRRS. *Z. ges. Brauw.* 1921, 199-204.—Comparative maltings by the Kropff system (Fr. pat. 432,243 (1911)), the ordinary floor method, and the pneumatic drum system substantially confirmed the conclusions of previous investigators respecting the Kropff system (cf. Adler, *C. A.* 12, 401). Judiciously applied, this system will effect a saving of 4% or more of the grain, by reducing the malting loss due to respiration and rootlet growth, and will produce malts equal to those obtained on the floors in respect of modification and ext. yield. The most pronounced feature of Kropff malts is their dark color. This is doubtless due to their high content of amino acids and other proteolytic products, which react with sugars during the kilning process (cf. Ruckdeschel, *C. A.* 9, 118). The richness of the Kropff malts in respect of amino acids also leads to formation of an abnormally large proportion of acids, esters, and higher alcs. during fermentation (cf. Ehrlich and Pitschimuka, *C. A.* 6, 2446) in consequence of which the beers acquire a somewhat vinous flavor.

J. S. C. I.

**Hydrogen-ion concentration in the brewery.** I. Colorimetric method of Michaelis for determining hydrogen-ion concentration and its application in brewing. W. WINDISCH, W. DIETRICH AND P. KOLBACH. *Wochschr. Brau.* 38, 275-6, 283-4, 289-90 (1921).—The colorimetric method proposed by Michaelis (*C. A.* 16, 1469) for the detn. of hydron concns. between  $p_H = 2.8$  and 8.4, when applied to worts and beers, gives results in close agreement with those of the electrometric method. The indicator solns. should be kept in the dark, and should be checked from time to time by means of solns. of known hydron concn., the prepn. of which from Na acetate and AcOH is described. App. based on the principle of the Walpole colorimeter may be used to reduce or eliminate errors arising from the natural color of wort or beer. Pale beers may be dild. 8-fold, dark beers 16-fold, and porters 40-fold without affecting the  $p_H$  value by more than 0.2. This is due to the action of the buffer salts present. A quant. measure of the buffer action of beers (*Nachgiebigkeit*), with respect to H and hydroxyl ions, resp., is suggested. It represents the percentage of the H ions contained

in 1 cc. of 0.1 *N* HCl (or of hydroxyl ions contained in 1 cc. of 0.1 *N* NaOH), which are de-ionized on mixing 1 cc. of the acid or alkali with 10 cc. of beer. For the beers investigated this value amounted to 90-92% in the case of H ions and over 99% in the case of hydroxyl ions. Beers of about the same hydron concn. may be compared, as regards their buffer action, by detg. for each the change of  $p_H$  resulting from addn. of 1 cc. of 0.1 *N* acid or alkali to 10 cc. of beer, but this comparison is not valid for beers differing considerably in hydron concn. II. W. WINDISCH AND P. KOLBACH. *Ibid* 295-7.—Titration of wort or beer with the aid of two suitable indicators affords data from which the original hydron concn. may be deduced. If the changes in the  $p_H$  value produced by treating 100 cc. of a wort or beer with successive 1 cc. increments of 0.1 *N* NaOH and 0.1 *N* HCl are plotted against the vols. of alkali and acid added (these being measured in opposite directions from the origin), the graph obtained is practically a straight line. This graph may accordingly be constructed if two points on it are detd. by titrating the wort or beer with alkali or acid with the aid of two indicators such as neutral red ( $p_H = 7.0$ ) and methyl orange ( $p_H = 4.53$ ) or  $\gamma$ -dinitrophenol ( $p_H = 4.88$ , cf. Michaelis, *C. A.* 16, 1469). Graphs of this kind show at once the  $p_H$  value of the untreated wort or beer, and afford information respecting the buffer action of the salts present, i. e., how much acid or alkali is required to produce any given change in the hydron concn.

J. S. C. I.

**Examination of brewer's spent grains.** F. ECKHARDT. *Z. ges. Brauw.* 1921, 81-4, 89-92, 97-101, 103-6, 111-15.—The analysis of spent grains is of great value in brewery control, and where the worts produced are of low gravity it affords more accurate information as to the degree of extn. of the malt than can be obtained by the usual method of detg. the brew-house yield. A representative sample of the grains may be obtained by mixing a number of small samples taken from the outlet of the grains screw conveyor. The percentage of sol. ext. in the grains may most conveniently be found by calcn. from the moisture content of the sample and the sp. gr. of the liquid expressed therefrom by means of a hand press. It is best to use the last runnings from the press for the detn. of sp. gr., since they have a slightly lower gr. than the first runnings and probably represent more nearly the av. for the whole of the liquid contained in the sample. If the sol. ext. has to be detd. on a dried sample, E. recommends mixing 25 g. of the finely ground material with water (200 cc.) at 70°, allowing the mixt. to digest until cold, and then making up to 300 g., mixing well, filtering, and detg. the sp. gr. of the filtrate; this method, however, gives higher results than the former one. For the detn. of undissolved ext. in grains a standard method is badly needed. E. suggests one in which 25 g. of the dried and finely ground sample is boiled with water, mashed with 100 cc. of malt ext. (1 : 4), made up to 300 g., and filtered. The sp. gr. of the filtrate is corrected for that of the malt ext., and also for the sol. ext. in the grains unless this has been removed previously by washing. E. describes a screening test applicable to grains samples, under water, for obtaining information concerning the character of the parent malt grist. Reference is made to the methods for detg. starch in spent grains, described by Kreuzer and by Wieninger (*C. A.* 5, 3493; 9, 3326). J. S. C. I.

**Fat of barley and malting-products.** J. SEDLMAYER. *Z. ges. Brauw.* 1921, 191-3.—A sample of brewing barley contained 2.07 g. of total fat per 100 g., including 0.11 g. of unsaponifiable matter, of which 0.065 g. consisted of sterols. There was present also 0.66 g. of lecithin, only 0.078 g. of which was obtained in the ether ext., the remainder being extd. by means of alc. Steeping of the barley produced no appreciable change in the quantity or character of the fat present. During germination the amt. of fat diminished to 1.41 g., wholly at the expense of the saponifiable portion, but kilning produced no further diminution. The abs. amts. of unsaponifiable matter and lecithin remained unchanged throughout the malting processes. As regards the const. of the

fat present at different stages of malting, it was found that the acid value increased from 17 to 32 during germination and diminished again to 20 on the kiln, but the sapon. value of the saponifiable portion of the fat remained const. at 191. The fat present in the malt combs and spent grains had acid values of 49 and 93, resp. In detns. of sapon. value it was found necessary to boil for 3 hrs. to obtain consistent results.

J. S. C. I.

**Bacteria as consumers of alcohol in beer and other alcoholic liquids.** P. LINDNER. *Wochschr. Brau.* 38, 206-7(1921).—Various bacteria isolated from beer sediments, barley steep water, and vat brushes, but not characterized, were found to develop in beer of low alc. content at the expense of the alc., provided air was not excluded. One bacterium reduced the alc. content of a beer from 4% to 1.7% in ten days. The use of unboiled water for diln., in the production of thin beers, may furnish sufficient O for such bacteria, but a high alc. content, e. g., 6%, appears to prevent their development.

J. S. C. I.

**Beers from mashes boiled under pressure.** J. RECHENBERG. *Z. ges. Brauw.* 1921, 184-6.—The Lazarus process of mash-boiling under pressure has been applied successfully in a German brewery. It may be adapted to various methods of mashing, and in the case described the preceding operations constitute an infusion process, the mash being held at 50° for peptonization and then heated slowly to 62-7° for saccharification, after which it is heated rapidly to boiling in the pressure vessel and when all the air has been driven out of the vessel the latter is closed and the pressure allowed to rise to 1.5 atm. The mash is then cooled rapidly to 70°, re-saccharified by addn. of diastase, and finally mashed-off at 90°. The chief advantage of the process lies in the high yields of ext. obtained, and the beers produced possess exceptional palate-fulness and head-forming capacity. Any undesirable flavoring or aromatic substances which may be extd. may be eliminated by allowing some steam to blow-off during the pressure boiling. More serious defects of flavor may result from the use of unsuitable brewing water, and especially from the presence of carbonates in the latter. Decarbonation is more important than when ordinary methods of mashing are employed. Occasionally traces of unconverted starch may be present in the wort when it is run off from the mash, and in such cases some diastase should be added when the wort is run into the Cu.

J. S. C. I.

**Use of zeamin in the production of beer.** W. WINDISCH. *Wochschr. Brau.* 38, 281-2(1921), cf. *C. A.* 15, 3721.—Zeamin is a maize flour practically free from oil and proteins, and is much preferable to maize grits for brewing purposes, as it gives a higher yield of ext., is not liable to become rancid, requires only a very short boiling, and is not likely to give rise to difficulties due to traces of unconverted starch passing into the Cu wort.

J. S. C. I.

**Drying yeast.** A. W. HIXSON. U. S. 1,420,630, June 27. Compressed yeast such as is obtained from nutrient solns. prepd. with use of molasses is mixed with 0.5-5% of plaster of Paris or  $\text{CaHPO}_4$  and dried after subdivision into small pieces or shreds, preferably by a current of air conditioned to effect the drying within a period of 12-30 hrs. so that the yeast when dried has a moisture content of about 10%. The dried product retains a high fermenting power for several weeks.

**Dried yeast.** E. KLEIN. U. S. 1,420,557, June 20. Moisture is evapd. from yeast until its moisture content is reduced to about 50-60%, in which condition it is at a "critical stage" of susceptibility to enzymic decompn. and at this stage moisture-absorbing or dehydrating substances such as starch or flour are added (preferably pre-heated) in order quickly to reduce the moisture content to about 30% before time for any material amt. of enzymic decompn. is permitted. The quantity of substance



added may be 50-100% of the wt. of the yeast and after the addition the drying is continued until the yeast contains about 15% moisture or less. Sugar or dextrins 2-5% may be added preferably after the moisture content has been reduced to 20-40% to assist in drying and to promote desirable enzymic activity. The drying also may be facilitated by the addition of a small amt of NaCl. Cf. C. A. 16, 2195.

**Dried yeast.** E. KLEIN. U. S. 1,420,558, June 20. Yeast is placed in a comminuting app. through which a current of air or other gas is conducted which dries the yeast, and as the particles of yeast become of requisite fineness and dryness they are conveyed by the air current to a collection chamber. Air of a temp. of 20-30° may be used until the moisture content of the yeast is reduced to about 30% and, after this, air of a temp. of 50° may be employed. An app. is described in which coarsely subdivided yeast is comminuted and dried on a perforated bottom of a chamber through which the air is passed. Cf. C. A. 16, 2195.

## 17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

**Bile salt as a vehicle for a pediculicide.** B. A. PETERS. *Brit. Med. J.* 1922, I, 204.—Good results have been obtained with *Ol. eucalypti*, 50 cc., Na taurocholate, 10 g., H<sub>2</sub>O to 1000 cc. It is considered that the bile salt assists the passage of fat emulsions through the cell of the louse-egg.

A. T. CAMERON

**Some new anesthetic ethers.** W. WEBSTER. *Can. Med. Assoc. J.* 12, 15-6 (1922).—Cotton-process Et<sub>2</sub>O showed no advantage over ordinary anesthetic Et<sub>2</sub>O. Ethanesal has given better results.

A. T. CAMERON

**Saponated cresol.** GUIDO STAFFELLA. *Boll. chim. farm.* 61, 257-62(1922).—Prepn. on a small scale and methods of analysis of saponated cresol, known commercially as "lysol."

A. W. DOX

**Identification of small quantities of terpinol hydrate in complex mixtures.** G. DENIGÈS. *Bull. soc. pharm. Bordeaux* 60, 49-54(1922).—Terpinol hydrate is identified by its cryst. form and by the color reaction which develops with the furfurolic reagent of Pettenkoef. A sample of the mixt. to be tested is placed on a glass slide and moistened with a drop of EtOH (85°). As the EtOH evap., the dissolved terpinol hydrate is deposited at the periphery in groups of prismatic needles, some of which represent the tufted ends of branches or feathers. A like amt. of the mixt. may be subjected to sublimation by placing it between two glass slides held apart by pieces of a match and placing a drop of H<sub>2</sub>O on the outer surface of the upper slide. On warming carefully with a low flame, dehydrated terpinol will be deposited on the upper slide in the form of needle-like crystals. On moistening with EtOH (85°) and allowing the EtOH to evap., characteristic crystals of terpinol hydrate will form. If a drop of H<sub>2</sub>SO<sub>4</sub> is added to the latter, a yellow coloration will develop which will pass to orange on heating. Finally a carmine-red color will develop on the addition of a drop of a soln. consisting of 0.5 g. of fructose in 25 cc. of EtOH (90-95°) and 75 cc. of H<sub>2</sub>O.

A. G. DuMEZ

**Formula for a ten percent solution of sulfur in a mixture of carbon disulfide and carbon tetrachloride.** J. SERRE. *Bull. soc. pharm. Bordeaux* 60, 73-5(1922).—Shake 10.4 g. of roll S with 60 cc. of CS<sub>2</sub>, filter, and make up to 100 cc. with CCl<sub>4</sub>.

A. G. DuMEZ

**Modification of the formula for "Peau sedative."** M. DANBY. *Bull. soc. pharm. Bordeaux* 60, 75-76(1922).—To prep. sedative water dissolve 3 drops of castor oil in 10 g. of spirit of camphor, add 60 g. of NH<sub>4</sub>OH (10%) and shake. Place this mixt. in a 1500-cc. flask and add to it, with const. shaking, 1000 cc. of a 6% aq. NaCl.

A. G. DuMEZ

**Matriculation sheets.** A. SCHAMELHOUT. *J. pharm. Belg.* **4**, 287-8, 300, 320, 334, 358, 374, 406, 444, 463-464, 480(1922).—Monographs intended for introduction into the Belgian National Formulary are presented for the following: K cantharidate, KCl, HCOOK,  $K_2S_2O_8$ , LiBr, Li benzoate, LiCl, Li citrate, LiI,  $MgCl_2 \cdot 6H_2O$ ,  $Mg(OH)_2$ ,  $Mg(ClO_4)_2 \cdot 6H_2O$ ,  $Mg_3(C_4H_7O_7)_2 \cdot 14H_2O$ ,  $MgC_2H_5(OH)_2PO_4$ ,  $MnSO_4 \cdot 4H_2O$ ,  $MnC_4H_7(OH)_2PO_4$ ,  $Mg(C_6H_4.OH.COO)_2$ . A. G. DU MEZ

**The second supplement to the French pharmacopeia.** A. SCHAMELHOUT. *J. pharm. Belg.* **4**, 309-11, 325-7, 349-51(1922); cf. C. A. **15**, 145.—The second supplement to the French pharmacopeia is reviewed in detail. Seven new items and a new formula for tincture of iodine have been added. The tincture of iodine contains 10 g. of I and 4 g. of KI in 136 g. of EtOH (90°). It is given the title *teinture d'iode officinale*. The new items added are colloidal Ag (collargol) by the chem. method, diacetylmorphine-HCl (heroine), emetine-HCl, ethylmorphine-HCl (dionine), K guaiacolsulfonate (thiocol),  $NaBO_3 \cdot 4H_2O$  and  $ZnO_2$ . A. G. DU MEZ

**Enesol.** G. REBIERE. *J. pharm. Belg.* **4**, 453-5(1922).—A polemical discussion in which arguments are advanced to show that "enesol" is a definite compd. formed by the equimol. combination of hydroxymercurisalicilic anhydride with sodium methane-arsenate. A. G. DU MEZ

**Clinical evaluation of rhubarb rhizomes grown in Germany.** L. KROEBER. *Stid-deut. Apoth.-Ztg.* **62**, 243-244(1921).—Clinical tests of the rhizomes obtained from *Rheum officinale* Baillon and *R. palmatum* L. grown in Germany show the latter to be the most active as a purgative, although they contain a smaller amt. of anthraquinone glucosides. The rhizomes of *R. officinale* assayed 3.93% of anthraquinones, whereas the rhizomes of *R. palmatum* assayed only 2.26%. K. attributes this to the greater emodin content of *R. palmatum* since the rhizomes of this species retain their activity undiminished after boiling with dil.  $H_2SO_4$  and extracting the hydrolyzed glucosides with  $CHCl_3$ . Emodin is but slightly sol. in  $CHCl_3$ . On the evidence furnished by these clinical tests, K. recommends that the cultivation of *R. palmatum* be carried on extensively in Germany. A. G. DU MEZ

**Two pinnate leaf Boronias and their essential oils.** M. B. WELCH AND A. R. PENFOLD. *J. Proc. Roy. Soc. N. S. Wales* **55**, 196-209(1922).—For purposes of comparison an incomplete investigation of the essential oil of *B. pinnata* Smith is first detailed. A colorless mobile oil of pleasant terpenic odor and with a most pronounced fluorescence was obtained in a max. yield of 0.1% from flowering branches of the plant. Physical consts. of 2 samples showed  $d_{18}^{20}$  0.8784, 0.8917;  $(\alpha)_D^{20}$  -4.7°, -15.25°;  $n_D^{20}$  1.4825, 1.4762. Neither yielded a nitrosochloride or bromide. All results point to the presence of a terpene or mixt. of terpenes, and show that the oil is quite distinct from that obtained from *B. thujona* sp. nov., which obtained in a 0.6% yield has a characteristic and powerful ketonic odor due to the presence of both  $\alpha$ - and  $\beta$ -thujone as chief constituents (80-90%). Physical consts.,  $d_{20}^{20}$  0.9121-0.9152;  $n_{20}^{20}$  1.4524-1.4569;  $[\alpha]_D^{20}$  varied from +13.91 to -56.54°. W. O. F.

**Sterilization of catgut.** M. BORNARD. *Mitt. Lebensm. Hyg.* **13**, 175-83(1922).—Catgut can be sterilized by agitation in a 10% tincture of I for a period of 48 hrs. Manuf. of the commodity for surgical purposes in Switzerland should be subjected to control. For the bacteriol. control of catgut, 50 cm. of the sample cut into fragments is gelatinized in a 5% soln. of  $Na_2CO_3$ , thereupon incubated for a period of 10 hrs., and the product then inoculated into mice. W. O. F.

**Essential oil of Lantana camara.** K. L. MOUDGILL AND P. N. VRIDHACHALAM. *Perfumery Essent. Oil Record* **13**, 173-4(1922).—A greenish yellow oil of pleasant and persistent odor, obtained in a yield of 0.2%, had  $d_4^{20}$  0.8842,  $[\alpha]_D^{20}$  14.7,  $n_D^{20}$  1.4899; acid no. 1.6, sapon. no. 4.6, acetyl no. 23.4, aldehyde content 2.4%. The oil contained

about 10 to 12% *l*- $\alpha$ -phellandrene, 80% of a sesquiterpene much resembling caryophyllene, and the rest a complex mixt. It appears that the oil would be of little direct value in perfumery.

W. O. E.

**Chemical structure of santoveronin.** A. MARX. *Pharm. Ztg.* **67**, 498(1922).—According to the rather vague description, naphthalene is made to combine with a "phenol group" whereby a compd. results having a toxicity 100 times greater than the parent substance. The new combination is then treated with colloidal CuO or  $\text{Al}_2\text{O}_3$ , the resulting product being santoveronin, a "naphthalenephenolate" of CuO or  $\text{Al}_2\text{O}_3$ .

W. O. E.

**Preparation of mucilago salep.** C. KESTING. *Pharm. Ztg.* **67**, 498(1922).—Especial reference is made to the procedure in the Pharmacopeia Helvetica.

W. O. E.

**Preparation of chaulmoogra oil derivatives for the treatment of leprosy.** A. L. DEAN AND R. WRENSHALL. *U. S. Public Health Rept.* **37**, 1395-9(1922).—A brief description of the routine methods used at the Univ. of Hawaii for making certain derivs. of chaulmoogra oil for therapeutic use.

W. O. E.

**A new antiseptic of high iodine content (diethylene disulfide tetraiodide).** C. BACHEM. *Biochem. Z.* **129**, 190-3(1922).—Diethylene disulfide tetraiodide,  $\text{I}_2(\text{CH}_2\text{CH}_2)_2\text{SI}_2$ , is a blue-black powder with mercaptan-like odor, contg. 10.19% S and 80.89% I. The ability to split off  $\text{I}_2$  depends on several factors and is not always parallel with the antiseptic strength.  $\text{H}_2\text{O}$ , EtOH and  $\text{Et}_2\text{O}$  produce decompn. and liberation of  $\text{I}_2$ . Protein solns. induce less destruction, while both daylight and sunlight are effective. The compd. was absolutely efficacious in preventing growth of microorganisms when used in comparative tests with  $\text{CHI}_3$ . The ingestion of 4 g. by a 2800-g. rabbit produced no visible toxic effect;  $\text{I}_2$  was found in the urine but no albumin. The compd. is strongly irritating to the rabbit cornea but not to the human skin. The influence on wounds was studied with inconclusive outcome.

F. S. HAMMETT

**Some chemical problems as applied to dentistry.** A. K. EPSTEIN. *Dental Cosmos* **64**, 636-40(1922).—A discussion of the chemistry of com. *dentifrices* and of the relationship of *vitamins* to dental diseases.

JOSEPH S. HEPBURN

**The effect of daylight on the content of active material in digitalis.** OTTO VON DAFERT. *Biedermann's Zentr.* **50**, 422-5(1921).—The toxicity of the ext. from *Digitalis* leaves depends on the time of day at which the leaves are gathered and how and when the leaves are killed. To obtain the most toxic ext. the leaves should be gathered in the afternoon and immediately killed by plunging them into 96% alc.

J. C. S.

**Analysis of shepherd's purse (*Capsella bursa pastoris*).** H. CAPPENBERG. *Pharm. Zentralhalle* **62**, 560-2(1921).—The method described by Grimme (cf. C. A. **16**, 790) is an improvement on the original process, but C. points out that the value of liquid ext. of *Capsella bursa pastoris* does not depend on the quantity of choline compds. present, since the ext. contains other active principles.

J. C. S.

**Color reactions of phenacetin and acetanilide.** L. EKKERT. *Pharm. Zentralhalle* **62**, 735-7(1921).—Under definite conditions, phenacetin and acetanilide give different colorations when hydrolyzed with  $\text{H}_2\text{SO}_4$  and then oxidized with  $\text{K}_2\text{Cr}_2\text{O}_7$ . If 0.1 g. of phenacetin is boiled for one min. with 5 cc. of 10%  $\text{H}_2\text{SO}_4$ , the sol. then cooled, dild. to 5 cc., and treated with 2 drops of 1%  $\text{K}_2\text{Cr}_2\text{O}_7$  solution, a violet-red or red coloration is obtained. Acetanilide under similar treatment, but when boiled for two min., yields gradually a greenish blue coloration.

J. C. S.

**Color reaction for nicotine and coniine.** JUAN A. SANCHEZ. *Semana med.* **28**, 61-4.—One drop of a soln. of nicotine or coniine gives on shaking with 5 cc. of a soln. of 0.5 g. of vanillin in 100 cc. of strong HCl a coloration varying from rose red to deep cherry red, according to the concn. The reaction is given also by indole and

scatole, but not by pyridine. The solns., examined spectroscopically, show two bands in the green ( $\lambda$  525 and 490) and one in the violet.

J. C. S.

**The active constituent of ergot.** K. SPIRO AND A. STOLL. *Verh. Schweiz. Nat. Ges.* 1920, reprint.—Ergotamine, obtained in crystallizable form from ergot, on treatment with MeOH gives a new, less active, alkaloid, *ergotaminine*. Ergotamine acts paralytically on the sympathetic system, causing contraction of plain muscular tissue, and a slight decrease in blood pressure. It acts on the uterus even at great dilns. Ergotaminine exerts a similar effect. Histamine takes no part in the typical ergot effect. Ergotamine, however, acts similarly to ergot and may be used in the same way.

J. C. S.

**Advantages of the extraction process for the preparation of perfumes.** GATTÉ-FOSSÉ. *Riv. ital. essenze profumi* 3, 109-10(1921).—While 3000-5000 kg. of roses is required to yield 1 kg. of otto by distn. with steam, 4000 kg. will yield by extrn. and steam distn. of the ext., in addn. to 1 kg. of volatile oil, about 2 kg. of a less volatile ext. which forms an excellent perfume base, particularly for soaps. Products of like character can be prep. also from patchouli, geranium, sandal wood, lavender, etc., and appear in commerce under the names "resin-odors," "resinoids," "resinaromas."

J. C. S. I.

**The effect of heating coccus indicus in relation to chemical identification of picrotoxin.** D. S. KABAYAO. *Am. J. Pharm.* 94, 425-8(1922).—The commonly recognized chem. tests for the identification of picrotoxin (of coccus indicus) cannot be depended upon when, as is the custom, the berries have been roasted over a free flame. Such a preparatory roasting of the substance in some way changes the chem. characteristics without any certain diminution or alteration of its toxic properties.

W. G. GAESSLER

**The stability of strophanthus extracts.** C. A. POMEROY AND F. W. HEYL. *Am. J. Pharm.* 94, 479-86(1922).—Strophanthus seed varies widely in potency, but tinctures retain their original strength, showing marked stability. Dil. aq. galenical solns. prepd. for hypodermic or intravenous injection, contg. the mixed strophanthins, deteriorate slowly. They should be discarded after about one year, although approx. 70% of the activity is retained at that time. Cryst. ouabain stored in dil. saline soln. (of hypodermic strength) showed a small rate of deterioration.

W. G. GAESSLER

**A new compound of hexamethylenetetramine with sulfosalicylic acid.** LAMBERTO CORRIDI. *Arch. int. pharmacodynamie* 26, 187-96(1922).—The sulfosalicylate of urotropine was prepd. and tested. It is claimed to be a non-toxic urinary antiseptic and diuretic, superior to urotropine. Small amounts of  $\text{CH}_4\text{O}$  were found in the urine and the urine became more acid in reaction following the administration of this substance.

W. A. PERLZWEIG

**An iodine solution applicable in practical medicine.** FRITZ PREGL. *Wiener klin. Wochschr.* 34, 288-9(1921).—The compn. of the prepn. is not given further than that it contains about 0.04% free I also  $\text{Na}^+$ ,  $\text{I}^-$ ,  $\text{IO}_3^-$  and  $\text{IO}^-$ . It is not only bactericidal but has also the property of stimulating the protective processes of the organism. A few animal expts. are detailed.

W. A. P.

**Identification tests for neoarsphenamine of importance for the physician.** L. KOFLER AND A. PERUTZ. *Wiener klin. Wochschr.* 34, 594-5(1921).—The purity of neoarsphenamine can be detd. by employing the following simple qual. tests: reduction of a  $\text{AgNO}_3$  soln. on test-paper—black ppt.; reduction of mercuric reagents: Millon's—dirty brown ppt., Nessler's—black ppt., alc.  $\text{HgCl}_2$  soln.—light yellow ppt.; with tincture of I a canary-yellow ppt. and with Lugol soln. a yellow color are produced; Br water gives a reddish brown ppt.,  $\text{FeCl}_3$  soln. a violet color. In all of the above tests a drop or more is added to a small quantity of the reagent. On the addition of some

3%  $\text{H}_2\text{O}_2$  soln. to a 10% soln. of the drug the yellow color of the latter disappears and after a few sec. a red color develops. With stronger solns. of  $\text{H}_2\text{O}_2$  (perhydrol) the red color appears immediately. If the nearsphenamine soln. be added to the peroxide a yellowish white ppt. appears which does not redissolve on the addition of an excess of the nearsphenamine soln. A review of the literature on the testing of the purity of nearsphenamine and on the detection of the common adulterants is given.

W. A. PERLZWEIG

**Novasurol as a diuretic.** HAGGENEY. *Mediz. Klin.* 18, 48-9(1922).—Novasurol,  $\text{HOHgC}_6\text{H}_5\text{ClOCH}_2\text{CO}_2\text{Na.Et}_3(\text{CONH})_2\text{CO}$ , exerts a very potent diuretic action when given by either intramuscular or intravenous injection. It is of particular value in heart and kidney conditions.

G. H. S.

**Assay of the official camphor preparations.** M. FRANÇOIS AND E. LUCE. *J. pharm. chim.* 25, 500-7; 26, 11-8(1922).—The polarimetric method for camphor (*K*) is exact and should be explicitly adopted by the Codex. The use of synthetic *K* should be banned. The following consts. for  $[\alpha]_D$  were found: soln. of *K* (10 g.) in abs. EtOH (100 cc.) + 43.0°; in 90% EtOH + 39.66°; in 60% EtOH (2.5 g. in 100 cc.) + 33.32°; in olive oil (10 g. in 100 cc.) + 53.15°; in "benzine" (4 g. in 100 cc.) + 40.62°. To assay *camphorated spirit* (*A*) (10 g. *K* + 90 g. 90% EtOH), and *tincture of camphor* (*B*) (100 g. *K* + 3900 g. 60% EtOH) for *K*, the concns. given are indicated by an angle  $\alpha = 6^\circ 40'$  for *A* and  $1^\circ 30'$  for *B* in a 200 mm. tube. Deviations from these amts. are directly proportional to changes in concns., which may thus be readily calcd. To det. the EtOH content, subtract from  $d_{15}$  of the soln. a calcd. amt. due to *K*; in *A*, each g. of *K* dissolved adds 0.00116, in *B*, 0.00044 to  $d_{15}$  of the EtOH used. To verify the nature of the *K*, evap. the solvent slowly over  $\text{H}_2\text{SO}_4$  from 50 g. of *A* or 100 g. of *B*, dissolve 2 g. of the residue in abs. EtOH to make 20 cc. and det.  $[\alpha]_D$ . In *camphorated oil* (*C*) (100 g. *K* + 900 g. olive oil), det. *K* as above; each g. indicates  $\alpha = 60'$ . The oil itself showed  $\alpha = 0^\circ 6'$ . Again to verify *K*, sublime 50 g. of *C* from a porcelain dish on a sandbath into a funnel and exam. the sublimate. Then, det. the nature of the oil, whether vaseline or fatty oil, by sapon. For the assay of *camphorated ointment* (*D*), use "benzine" as a solvent. Soln. of 4 g. *K* in 100 cc. benzine shows  $\alpha = 3^\circ 20'$  in a 200 mm. tube. To 10 g. of the ointment add "benzine," cold, about 35 g.; after soln. (in about 2 hrs.) fill up to 50 cc., mix, filter through a covered funnel, polarize and calc. results.

S. WALDBOTT

**Methods of preservation of essential oils.** S. DEMIÉVILLE. *Bull. sci. pharmacol.* 29, 311-4; *Schweiz. Apoth. Ztg.* 60, 261-4(1922).—Addition of an equal vol. of purest 95° EtOH will preserve 66 specified oils; 21 others require larger vols., or the use of abs. EtOH, the amts. being stated for each oil.

S. WALDBOTT

**Pregl's (isotonic) iodine solution.** FLEISSIG. *Schweiz. Apoth. Ztg.* 60, 322, 350(1922).—A semi-secret prepn. probably prepd. as follows (*Pharm. Ztg.*): To soln. of  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  in 30 g.  $\text{H}_2\text{O}$  add 3 g. finely powd. I, allow to stand for 24 hrs., rotating frequently; or warm to 40° on a water bath. When all I is in soln., add 4 g. NaCl and  $\text{H}_2\text{O}$  to make 1 l. Bring this to 0.035 - 0.04% I (F. Pregl, *C. A.* 16, 2961), by gently warming the soln. or part of it until 20 cc. are decolorized by 0.55-0.65 cc. 0.1 *N*  $\text{Na}_2\text{S}_2\text{O}_3$ ; or till the tint is the same in equal liquid depth as that obtained by a mixt. of 10 drops of 0.1 *N* I and 15 cc.  $\text{H}_2\text{O}$ .

S. W.

**Paniculatine, the alkaloid of Aconitum paniculatum Lam.** G. E. BRUNNER. *Schweiz. Apoth. Ztg.* 60, 357-8(1922).—This  $\text{Et}_2\text{O}$ -sol. alkaloid, recrystd. from MeOH, forms rhombic prisms, m. 263° (aconitine 198°), compn.  $\text{C}_{29}\text{H}_{35}\text{NO}_7$ . Cf. *C. A.* 16, 2387.

S. W.

**Examination of crocus.** A. TSCHIRCH. *Schweiz. Apoth. Ztg.* 60, 373-4(1922).—The EtOH-sol. coloring matter of saffron is identical with *crocin*, the hydrolytic

deriv. of the  $H_2O$ -sol. glucoside *crocin* also contained in saffron. The Pharm. Helv. IV requirement of extg. saffron with  $H_2O$  only is too strict for com. samples except for "safran coupé." The use of hot EtOH after extg. with  $H_2O$  should be admitted. The absorption spectrum of the crocus coloring matter is similar to, but not identical with, that of carotin. S. W.

**Diagnostical elements in drug anatomy and their nomenclature.** THEO. HOLM. *J. Am. Pharm. Assoc.* 10, 450-3(1921).—Chiefly criticisms of the U. S. Pharmacopeia pharmacognostical descriptions of several root drugs. L. E. WARREN

**Bleached coriander.** J. A. BAKER. *J. Am. Pharm. Assoc.* 10, 453-6(1921).—The effects of bleaching coriander with  $SO_2$  both in the dry and wet state were studied. For 100 g. of dry drug 4 g. of  $SO_2$  were used. The result was a satisfactory yellow color. Twice the amount of  $SO_2$  did not improve the color while half the amount proved insufficient. In the wet way subjection of the drug to 2%  $SO_2$  for 1 min. was most satisfactory. Unbleached drug yielded 0.185% of volatile oil while the bleached drug yielded none. L. E. WARREN

**The extraction of licorice.** W. L. SCOVILLE. *J. Am. Pharm. Assoc.* 10, 688-90 (1921). Licorice is one of the most troublesome drugs from which to prep. galenicals. The flavoring principle, glycyrrhizin is extd. by  $H_2O$ , but this exts. a large amt. of albuminous substances which tend to cause decompn. in the finished product. The use of an EtOH menstrum would solve the difficulty but its cost is prohibitive. A good prepn. may be made by extn. with boiling  $H_2O$ , concn. by evapn. and adding 30 to 37.5% of  $C_2H_5(OH)_3$ . The addition of 65 to 73% EtOH to the concd. ext. is satisfactory but is too costly. The solid ext. is conveniently made by extn. with boiling  $H_2O$ , evapn. to small vol., filtering and further evapn. to pilular consistency. L. E. W.

**Observations on muira-puama.** H. W. YOUNGKEN. *J. Am. Pharm. Assoc.*, 10, 690-2(1921).—Histology of the root. Proprietary prepn. of the drug are mentioned. L. E. W.

**Notes on the ash yield of cannabis.** E. L. NEWCOMB, C. E. SMYTHIE AND E. R. HODGE. *J. Am. Pharm. Assoc.* 10, 695-7(1921).—The ash of 7 specimens of com. drug varied from 12.27 to 16.94% and the HCl-insol. ash from 1.91 to 7.13%. The ash of cannabis seed varied from 5.87 to 6.14% and the HCl-insol. ash from 1.91 to 2.12%. Drug grown in Minnesota was collected. Small amts. of seed were always present. The ash of 13 specimens varied from 13.48 to 18.20% and the HCl-insol. ash from 2.53 to 5.13%. Some sand adheres to the drug in dry weather. The present U. S. P. ash standard of 15% appears difficult to meet. An acid-insol. standard of 4 or 4.5% would seem satisfactory and is proposed. A limit of 10% for fruits, seeds and other foreign matter is proposed. L. E. W.

**Further notes on tincture of cantharides.** F. W. NITARDY. *J. Am. Pharm. Assoc.* 10, 705(1921).—The formula recommended in 1919 (*C. A.* 14, 1003) is not satisfactory at all times or under all conditions. The subject requires further investigation. L. E. W.

**Alkaloids in the rhizomes and roots of ipecac.** ARNO VIEHOEVEER AND C. O. EWING. *J. Am. Pharm. Assoc.* 10, 763-6(1921).—It is unsettled whether the rhizomes of ipecac should be excluded from the drug because of lack of alkaloids. A specimen of Rio and one of Cartagena ipecac were separated into (A) annulated roots, (B) smooth roots and (C) rhizomes and each assayed. For Rio the total alkaloids found were (A) 1.94, (B) 2.00 and (C) 1.60%. For Cartagena the values were for (A) 1.88, (B) 1.05 and (C) 1.05%. Other analyses gave results for (A) stems and (B) roots. Rio (A) 1.84 and (B) 3.75%; Rio (A) 1.6 and (B) 2.13%; Cartagena (A) 1.22 and (B) 2.03%. Nine other specimens of Cartagena ipecac containing from 10 to 25% of "stems" assayed from 1.78 to 2.92% of Et<sub>2</sub>O-sol. alkaloids. There was no relation between the % of

"stems" and the % of alkaloids. It is recommended that the rhizomes be admitted as a part of the official drug, ipecac. L. E. W.

**The lead content of Burow's solution.** JOSEPH L. MAYER. *J. Am. Pharm. Assoc.* 11, 514-6(1922).—Burow's solution was prepd. strictly according to the N. F. IV. Theoretically it should contain only traces of Pb. Detns. of Pb. by 3 methods gave a mean of 0.0682 g. of Pb per 100 cc. The expts. demonstrate that although the soly. of  $\text{PbSO}_4$  is about 0.035 g. per l. at  $10^\circ$ , the soly. is considerably greater in a mixt. of  $\text{Al}(\text{C}_2\text{H}_3\text{O}_2)_3 + \text{C}_2\text{H}_3\text{O}_2$ . L. E. W.

**The determination of total iron in pharmaceutical preparations.** J. F. WILLIAMS. *J. Am. Pharm. Assoc.* 11, 516-7(1922).—A number of methods were considered. The one selected is as follows: Add 10 cc. of  $\text{H}_2\text{O}$  and 5 cc. of  $\text{HNO}_3$  to 10 cc. of the soln., boil for 5 min., add 5 cc. of 10%  $\text{NH}_4\text{Cl}$  and  $\text{NH}_4\text{OH}$  to neutrality or slight acidity. Cool and run in  $\text{H}_2\text{S}$  for 1 min., add an excess of  $\text{NH}_4\text{OH}$ , and pass in an excess of  $\text{H}_2\text{S}$ . Filter through a Buchner funnel overlaid with asbestos and wash the ppt. with 3 portions of 15 cc. each of 1%  $(\text{NH}_4)_2\text{S}$  and 1%  $\text{NH}_4\text{Cl}$ . Pass hot 10%  $\text{H}_2\text{SO}_4$  through the funnel to dissolve  $\text{FeS}$ , boil the filtrate to expel  $\text{H}_2\text{S}$ , cool and titrate with 0.1N  $\text{KMnO}_4$ . The method gives accurate results. L. E. W.

**Platt's chlorides.** ANON. *J. Am. Med. Assoc.* 79, 319-20(1922).—This prepn. claims to contain "chloride of lime." Examn. reveals no hypochlorites. Since the prepn. contains an iodide,  $\text{HOCl}$  could not be present. L. E. W.

**Anesthetic.** J. A. KLEIN. U. S. 1,420,634, June 27. A mixt. adapted for use as a local anesthetic in dentistry is formed by macerating *folia-menthae* and *folia-urticae* 2 and 3 parts, resp., in ether 110 parts and adding 100 parts of the soln. thus prepd. together with 400 parts of beechwood creosote to a liquefied mixt. produced by warming together menthol 200 and trichloroacetic acid 300 parts.

**Ethyl esters of *p*- $\beta$ -hydroxyethylaminobenzoic acid and of *p*-bis- $\beta$ -hydroxyethylaminobenzoic acid.** J. ALTWEGG AND J. LANDRIVON. U. S. 1,418,900, June 6.  $\text{HO}-\text{CH}_2\text{CH}_2\text{NHC}_6\text{H}_4\text{CO}_2\text{Et}$ , colorless crystals, m.  $63-64^\circ$ ,  $b_4$   $213-214^\circ$ , is obtained by distn. under reduced pressure after heating a mixt. of equimol. proportions of  $\text{H}_3\text{NC}_6\text{H}_4\text{CO}_2\text{Et}$  and  $(\text{CH}_2)_3\text{O}$  at  $50^\circ$  for several hrs.  $(\text{HOCH}_2\text{CH}_2)_2\text{NC}_6\text{H}_4\text{CO}_2\text{Et}$ , white lamellas, m.  $94^\circ$ ,  $b_{2-4}$   $246^\circ$ , is similarly obtained from 2 mol. proportions of  $(\text{CH}_2)_3\text{O}$  with the addition of small quantities of  $\text{H}_2\text{O}$  and alc. These compds. are only slightly sol. in  $\text{H}_2\text{O}$ , more sol. in alc., very sol. in most org. solvents and in fatty substances, sol. in dil. inorg. acids (from which they are pptd. by alkalies) and are adapted for use as local anesthetics in dentistry.

**Hydrogenated *N*-alkylpyridine-3-carboxylates.** R. WOLFFENSTEIN. Ger. 340,873. *N*-Alkylhalides of alkylpyridine-3-carboxylates are treated with metals and hydrogen halides in the presence of non-hydrolyzing solvents. E. g., methyl pyridine-3-carboxylate-*N*-methochloride is dissolved in MeOH. Sn is added and a current of HCl is passed for 3 to 4 hrs. at  $100^\circ$ , whereby methyl *l*-methylhexahydropyridine-3-carboxylate is formed as a liquid,  $b_{21-5}$   $86-9^\circ$ . The *l*-methochloride of methyl pyridine-3-carboxylate can also be reduced without warming by Sn and HCl, formic acid being used as a solvent. Ethyl pyridine-3-carboxylate-*N*-ethiodide dissolved in alc. may be similarly reduced by Mg and HCl. The products have therapeutic uses.

***N*-Alkylhalides of methyl pyridine-3-carboxylate (methyl nicotinate).** R. WOLFFENSTEIN. Ger. 340,874. Methyl pyridine-3-carboxylate is treated with alkyl halides. E. g., methyl pyridine-3-carboxylate is heated at  $100^\circ$  under pressure with MeBr and MeOH for 48 hrs. After removal of MeOH by distn., the *N*-methobromide is obtained from the residue; it forms crystals, m.  $71^\circ$ . The *N*-methiodide forms light yellow crys-

tals, m. 130°. The *N*-methochloride forms white crystals, m. 98°. The compds. have therapeutic uses.

**Acetylsalicyl compounds of quinine and its derivatives.** E. MERCK, C. DIEHL AND H. MAYEN. Ger. 338,853. *o*-Acetoxybenzoyl chloride is allowed to react with mol. proportions of quinine or its derivs. in a suitable solvent. By the action of *o*-acetoxy-benzoyl chloride on dry quinine in dry alc., *o*-acetoxybenzoyl-quinine hydrochloride is obtained in white needles or plates, m. 242° (decompn.). From a soln. of ethylhydrocupreine in dry toluene, *o*-acetoxybenzoylethylhydrocupreine hydrochloride is similarly prepd.; it forms white needles, m. 252° (decompn.).

**Preparation of a new acridine compound.** L. CASSELLA & Co., G.m.b.H. Swiss 80,241. CH<sub>2</sub>O is allowed to react with a 3,6-diamino-10-methylacridinium salt. *E. g.*, 3,6-diamino-10-methylacridinium chloride is dissolved in water and mixed with *N*-HCl. On addn. of 30% CH<sub>2</sub>O a bright orange-colored suspension is obtained. After agitation, the condensation product is sepd., washed with *N*-HCl and water, and dried; it is a brick-red powder with antiseptic properties.

**Nitrosulfonic acids of hydrogenated cinchona alkaloids.** C. F. BOEHRINGER & SÖHN. Ger. 338,738. Nitrosulfonic acids are prepd. by dissolving hydrogenated cinchona alkaloids or their salts in a mixt. of H<sub>2</sub>SO<sub>4</sub> and HNO<sub>3</sub>, or HNO<sub>3</sub> or an alkali nitrate is added to a soln. of them in H<sub>2</sub>SO<sub>4</sub>, or their nitro compds. are dissolved in strong H<sub>2</sub>SO<sub>4</sub>. Nitrohydrocinchonidinesulfonic acid, C<sub>19</sub>H<sub>25</sub>O<sub>7</sub>N<sub>3</sub>S, forms yellow, microscopic crystals; hexagonal plates are obtained from MeOH; it is decomposed by heating with HCl, giving nitrohydrocinchonidine and H<sub>2</sub>SO<sub>4</sub>. It chars without melting. Nitrohydroquininesulfonic acid, C<sub>20</sub>H<sub>25</sub>O<sub>7</sub>N<sub>3</sub>S, forms yellow needles; it chars without melting on heating above 250° and darkens on exposure to light. By heating with HCl, H<sub>2</sub>SO<sub>4</sub> and nitrohydroquinine are obtained. The latter forms thin, yellow leaflets, m. 212° (decompn.). Nitroethylhydrocupreinesulfonic acid, C<sub>21</sub>H<sub>27</sub>O<sub>7</sub>N<sub>3</sub>S, forms yellow crystals which darken at about 260° and char at about 280° without melting. It is decomposed on heating with HCl into H<sub>2</sub>SO<sub>4</sub> and nitroethylhydrocupreine.

**Aminosulfonic acid of hydrogenated cinchona alkaloids.** C. F. BOEHRINGER & SÖHN. Ger. 339,947. Nitrosulfonic acids, derived from hydrogenated cinchona alkaloids, are reduced by means of FeSO<sub>4</sub> and alkali hydroxide. *E. g.*, nitrohydroquininesulfonic acid is reduced by FeSO<sub>4</sub> in the presence of an aq. or MeOH soln. of Ba(OH)<sub>2</sub> to aminohydroquininesulfonic acid; it forms yellow needles, m. 222-4°. The red cryst. sulfate gives aminohydroquinine, m. 216-8°, by hydrolysis with strong HCl.

## 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

FRED C. ZEISBERG

**Niter pot vs. ammonia converter.** CHARLES COOPER. *Chem. Age* (London) 6, 826-8(1922).—The relative costs of NH<sub>3</sub> oxidation and niter potting are discussed in some detail, and it is concluded that the former is the more economical even at present, with every probability of its becoming relatively more so in the future. Two very excellent graphs are given, based on a 15% loss in NH<sub>3</sub> oxidation and none in niter potting, from which it is easy to calculate what percentage saving is possible under various market prices of niter, sulfuric acid and NH<sub>3</sub> liquor. F. C. Z.

**Intensive systems of sulfuric acid manufacture.** S. J. TUNGAY. *Chem. Age* (London) 6, 831-2(1922).—The *Duron Tower* system of H<sub>2</sub>SO<sub>4</sub> manufacture is carried out in 6 masonry towers: a small finishing tower, a Glover tower, 2 reaction towers and 2 Cay-Lussac towers. Of these, only the reaction towers need be housed. All are built slightly conical, so as to be self-sustaining, and are so grouped that short con-



necting pipes can be used. The ground space occupied is about 25% of that necessary for a standard chamber set. The cost of acid made by this system in Germany in 1914 was 19.372 marks per ton 60°Bé.

F. C. Z.

**Thermal considerations in sulfuric acid concentration.** F. C. ZEISBERG. *Chem. Met. Eng.* 27, 22-6(1922).—The literature on the *specific heat, b. p. and heat of diln.* of various concns. of  $H_2SO_4$  solns. is reviewed and graphs of these properties are constructed, showing the most probable values. The *compn. of vapors in contact with boiling  $H_2SO_4$  solns.* is given. Finally, two graphs are shown, constructed from figures calcd. from the previously developed graphs, which give the heat necessary to raise 1 lb.  $H_2SO_4$  in the form of various strengths of acid from various temps. to the b. p. and the heat necessary to concentrate 1 lb.  $H_2SO_4$  from any strength acid at the b. p. to 98.5%, also at the b. p. Examples are given of the use of these graphs in  $H_2SO_4$  concn. app. design.

F. C. Z.

**Concentration of sulfuric acid.** PETER S. GILCHRIST. *Chem. Age (N. Y.)* 30, 257-60(1922); *Chem. Met. Eng.* 26, 1159-62(1922).—Cascade, cascade-tower, and tower systems of  $H_2SO_4$  concn. are discussed. Surface evaporation-tower and hot air submergence systems are described more fully and a drawing of the latter, patented by Hechenbleikner and Gilchrist, is shown. Costs of concn. by the cascade, from 60° to 66°; the cascade-tower, from 54° to 66°; the tower, from 54° to 66° and the tower for sludge acid from 35° to 66° are given in detail, and total, respectively, per ton 66° acid: \$3.40, \$3.14, \$1.14 and \$4.18. The article is a good review of the whole process of  $H_2SO_4$  concn.

F. C. Z.

**Hydrochloric acid by the direct union of hydrogen and chlorine.** HUGH KELSEY MOORE. *Chem. Age (N. Y.)* 30, 273-4(1922).—The plant of the Brown Company is briefly described, with one illustration. An excess of  $H_2$  is used, under slight pressure. The  $Cl_2$  is supplied under suction, and air to keep down the combustion temperature is supplied with it. The process is extremely simple to operate and once started runs without attention.

F. C. Z.

**The occurrence and effect of fluctuating combustion in the sulfur burners of the Grillo oleum plant.** F. D. MILES AND W. SARGINSON. *J. Soc. Chem. Ind.* 41, 183-7T(1922).—With pan burners, 12 to a block, great difficulty was encountered in obtaining even a reasonably constant gas strength, owing to inherent fluctuations when charging. The use of iron tubes in *sampling the  $SO_2$  gas* was found to lead to errors: hard glass was satisfactory. The fluctuations in gas strength caused fluctuations in the conversion: a rise from 5.75 to 6.75%  $SO_2$  caused a drop in conversion from 93.0 to 92.25%. When the average gas strength was lower, the conversion was not so greatly affected by fluctuations in its strength. The converters contained four layers of 0.3% platinized  $MgSO_4$ , each layer containing 2300 lbs.

F. C. Z.

**Nitric acid from saltpeter or synthetic ammonia.** GUY B. TAYLOR. *Chem. Age (N. Y.)* 30, 244-6(1922); *Chem. Met. Eng.* 26, 1217-19(1922).—The steps in the process of  $NH_3$  oxidation and the  $NaNO_3$ - $H_2SO_4$  process for  $HNO_3$  manuf. are compared, from operation and cost standpoints. A graph is given enabling a ready comparison to be made of the costs of the two processes. It is concluded that the niter process has a slight advantage at present for strong  $HNO_3$  manuf. which will, however, tend to disappear as synthetic  $NH_3$  becomes more common. Chamber  $H_2SO_4$  plants and industries using weak  $HNO_3$  could profitably employ  $NH_3$  oxidation immediately.

F. C. Z.

**Damage to lead chambers caused by wood wasps.** F. PAX. *Jahresheft Ver. Schlesische Insektenkunde*. Reprint, 12 pp.—A large no. of circular perforations, from 6 mm. diam. downwards, discovered in the bottoms of the lead chambers of a new Silesian acid works, were proved to be caused by newly hatched wood wasps, *Sirex*

*gigas* and species of *Paururus*, whose larvae were found in the flooring. In some cases the wasps had died before completely boring through the lead, causing minute leaks very difficult to detect. As the time of development of these insects varies from two to four years, and no means could be devised to kill the larvae within the wood, sheet iron had to be placed between the lead and wood over the whole of the chamber floors as the only guard against further attacks. Provision was made for the removal of the iron at the end of two years. Such infection of timber can be avoided by employing sound wood felled in winter, removed from the forest before May, and preferably creosoted or tarred at the sawmills.

J. S. C. I.

**Some economic aspects of ammonia oxidation.** G. B. TAYLOR. *Chem. Met. Eng.* 26, 1217-9 (1922).—Taking as a basis for comparison a plant producing 25,000 tons strong  $\text{HNO}_3$  per annum,  $\text{NaNO}_3$  has a slight advantage over  $\text{NH}_3$  under present conditions. The greatest handicap under which the  $\text{NH}_3$ -oxidation process labors is the cost of concg. the weak  $\text{HNO}_3$ . The price of  $\text{NH}_3$  will probably fall, but in that case the Chilean tax on  $\text{NaNO}_3$  will no doubt be reduced to meet the resulting competition. At the present time, however,  $\text{NH}_3$  oxidation can profitably replace  $\text{NaNO}_3$  in (1) the lead chamber process for  $\text{H}_2\text{SO}_4$  and (2) a few industries consuming large quantities of weak  $\text{HNO}_3$ .

E. G. R. ARDAGH

**The Bucher process for the fixation of nitrogen.** M. DEKAY THOMPSON. *Chem. Met. Eng.* 26, 124-7 (1921).—In small-scale expts. on the production of  $\text{NaCN}$  from  $\text{Na}_2\text{CO}_3$ , C and Fe, it has been observed that the finer the particles of Fe and C the higher the conversion of the Na to cyanide; and that those forms of C which have very little ash, such as petroleum coke, lampblack, gas carbon and charcoal, give better results than high ash C such as coke. Suggestions are given for improvements in the design of furnaces for use in the manuf. of  $\text{NaCN}$ .

W. H. ROSS

**Plant for the preparation of ammonium chloride.** GG. ILLERT. *Chem. App.* 9, 59-60 (1922).—A description, with plan and elevation, of the Hirzel app. for the prepn. of  $\text{NH}_4\text{Cl}$  from strong gas liquors and crude  $\text{HCl}$ .

J. H. MOORE

**Production of sodium sulfate from ammonium sulfate and sodium chloride.** W. DOMINIK. *Przemysl Chem.* 5, 257-63 (1921).—The most favorable conditions for the conversion of  $\text{NH}_4$  sulfate into Na sulfate are, on exptl. and theoretical grounds, stated to be a proportion of 69 g. of  $\text{NH}_4$  sulfate to 61 g. of  $\text{NaCl}$  and 100 g. of water, in presence of about 16 g. of  $\text{NH}_4\text{Cl}$ , at about  $600^\circ$ .

J. S. C. I.

**Potash from feldspar.** SYDNEY JOHNSTONE. *Imp. Inst. Monograph* 1922. This monograph deals with the sources of the world's supply of K and among these the feldspars of Canada are important. A process of extracting K from feldspar is now on trial at the works of the National Portland Cement Co., Durham, Ont.

O. P. R. O.

**Preparation of sodium bicarbonate.** E. TOPORESCU. *Compt. rend.* 174, 870-3 (1922).—Equilibria involved in the reaction  $\text{NaCl} + \text{NH}_4\text{HCO}_3 = \text{NaHCO}_3 + \text{NH}_4\text{Cl}$  have been detd. at  $15^\circ$ . Detns. at  $35^\circ$  and  $50^\circ$  are in progress. The compds., expressed in g. per 100 g.  $\text{H}_2\text{O}$ , of the satd. solns. at  $15^\circ$  are given below. For 1 solid phase:  $\text{NaCl}$ , 35.7;  $\text{NH}_4\text{Cl}$ , 35.1;  $\text{NaHCO}_3$ , 8.9;  $\text{NH}_4\text{HCO}_3$ , 18.4. For 2 solid phases:  $\text{NaCl} + \text{NH}_4\text{Cl}$ , 27.2  $\text{NaCl} + 20.3 \text{NH}_4\text{Cl}$ ;  $\text{NaCl} + \text{NaHCO}_3$ , 35.7  $\text{NaCl} + 1.05 \text{NaHCO}_3$ ;  $\text{NaHCO}_3 + \text{NH}_4\text{HCO}_3$ , 6.2  $\text{NaHCO}_3 + 19.6 \text{NH}_4\text{HCO}_3$ ;  $\text{NH}_4\text{HCO}_3 + \text{NH}_4\text{Cl}$ , 35.4  $\text{NH}_4\text{Cl} + 7.02 \text{NH}_4\text{HCO}_3$ . At 2 triple points:  $\text{NaCl} + \text{NH}_4\text{Cl} + \text{NaHCO}_3$ , 10.5 Na + 6.6  $\text{NH}_4$  + 29.3 Cl + 1.2  $\text{HCO}_3$ ;  $\text{NH}_4\text{Cl} + \text{NH}_4\text{HCO}_3 + \text{NaHCO}_3$ , 3.4 Na + 11.2  $\text{NH}_4$  + 24.5 Cl + 5.9  $\text{HCO}_3$ . These data, expressed as g. of  $\text{H}_2\text{O}$  required to dissolve 1 mole of the mixt., are plotted on a diagram of the type described in *C. A.* 15, 1445.

D. MACRAE

**Manufacture of soda by the ammonia process.** H. LECHATELIER. *Compt. rend.* 74, 836-41 (1922).—With the aid of a diagram (cf. *C. A.* 15, 1445) and the data of Top-

orescu (preceding abstract) the fraction of NaCl convertible into  $\text{NaHCO}_3$  is calcd. for varying initial concns. of NaCl at  $15^\circ$ . At this temp. there is an optimum initial concn. of 0.5 M NaCl and slight deviations from this concn. cause sharp decreases in the yield of  $\text{NaHCO}_3$ . The conclusions of this paper cannot be directly applied to the control of industrial practice because there the temp. is always higher than  $30^\circ$  and the conversion to carbonate is never complete. Expts. in progress will finally allow a completion of this discussion.

D. MACRAE

**Lead and zinc pigments and salts in 1921.** C. E. SEBENTHAL AND A. STOLL. U. S. Geol. Survey, *Mineral Resources of U. S., 1921*, Part I, 55-62 (preprint No. 8, published July 10, 1922).

E. H.

**Strontium in 1921.** GEO. W. STROSE. U. S. Geol. Survey, *Mineral Resources of U. S., 1921*, Part II, 31-2 (preprint No. 8, published July 5, 1922).

E. H.

**Potash in 1921.** M. R. NOURSE. U. S. Geol. Survey, *Mineral Resources of U. S., 1921*, Part II, 51-63 (preprint No. 11, published July 10, 1922).

E. H.

**Fluorspar and cryolite in 1921.** H. W. DAVIS. U. S. Geol. Survey, *Mineral Resources of U. S., 1921*, Part II, 39-50 (preprint No. 10, published July 6, 1922).

E. H.

**Phosphate rock in 1921.** K. W. COTTRELL. U. S. Geol. Survey, *Mineral Resources of U. S., 1921*, Part II, 65-8 (preprint No. 12, published July 11, 1922).

E. H.

**Slate in 1921.** G. F. LOUGHLIN AND A. T. COONS. U. S. Geol. Survey, *Mineral Resources of U. S., 1921*, Part II, 23-30 (preprint No. 7, published June 29, 1922).

E. H.

**Asbestos in 1920.** EDWARD SAMPSON. U. S. Geol. Survey, *Mineral Resources of U. S., 1920*, Part II, 309-22 (preprint No. 32, published July 7, 1922).

E. H.

**Carbon black produced from natural gas in 1921.** E. G. SIEVERS. U. S. Geol. Survey, *Mineral Resources of U. S., 1921*, Part II, 33-7 (preprint No. 9, published July 5, 1922).

E. H.

**Fluorspar in British Columbia.** WM. F. ROBERTSON. *B. C. Annual Rept. of the Minister of Mines* No. 24(1921).—The Consolidated Mining and Smelting Co. produced during 1921 7,500 tons of  $\text{CaF}_2$  concentrates, carrying 87%  $\text{CaF}_2$  and 6%  $\text{SiO}_2$ .

O. P. R. O.

**World's graphite production in 1921.** ANON. *Can. Mining J.* 43, 233(1922).—Production in 1921 was less than at any time since 1902. Canada and Ceylon fell greatly behind prewar tonnages. Korea held its own. Germany alone forged ahead with an increase of 50 % over 1920.

O. P. R. O.

**Dutch bauxite.** ANON. *Raw Materials Review* 1, 58(1922).—Bauxite mines are being worked by an American company at Moengo, in the Dutch East Indian colony of Surinam. The bauxite contains 55%  $\text{Al}_2\text{O}_3$ . In Surinam the ore is dried only, the Al being extracted in the furnaces in America.

O. P. R. O.

**Cobalt oxide in Canada.** CHAS. W. DRURY. *Ont. Bur. of Mines Rept.* 27, Pt. 3, 31(1918).—Previous to 1903 Europe controlled the world's supply of Co. Since its discovery in Canada at that time, very little has been mined. Canada produces from the Co ore a very high grade  $\text{Co}_2\text{O}_3$ . In the European refineries ores were treated for the Co content alone, while from the ores of Canada, metallic Ag, Co, Ni and  $\text{As}_2\text{O}_3$  are recovered. The associated metals are often a source of revenue for the smelters.

O. P. R. O.

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The explosions at Zschornowitz and Bodio (RASCHIG) 24.

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**Hydrochloric acid and carbon monoxide.** H. W. PAULUS. U. S. 1,420,209, June 20. Cl and  $\text{H}_2\text{O}$  vapor are mixed and passed through an incandescent mass of C in a

vessel from which air is excluded except for the admission of sufficient air to maintain the C at incandescence, in order to form HCl and CO.

**Concentrated nitric acid.** E. BERGVE. Can. 220,467, July 4, 1922. An excess of liquid oxides of N is acted upon with O and "aq. liquid." The aq. layer of the resulting product is treated to produce  $\text{HNO}_3$  and the non-aq. layer is returned into the process. Part only of the aq. layer may be formed into concd.  $\text{HNO}_3$  and the remainder returned to the process with the non-aq. layer.

**Sulfuric acid.** C. H. MACDOWELL and H. H. MEYERS. U. S. 1,420,202, June 20. A catalyst formed of V and Al oxides is used for producing  $\text{SO}_3$  by the oxidation of  $\text{SO}_2$ . U. S. 1,420,203 relates to the production of a catalyst adapted for this purpose by forming porous briquets of  $\text{V}_2\text{O}_5$  10 and  $\text{Al}_2\text{O}_3$  90 %.

**Recovering nitrogen oxides in sulfuric acid manufacture.** A. M. FAIRLIE. U. S. 1,420,477, June 20.  $\text{SO}_2$  is removed from exit gases of a  $\text{H}_2\text{SO}_4$  plant by oxidation and lower N oxides are then oxidized to higher oxides and absorbed.

**Oxidizing ammonia.** C. H. MACDOWELL, H. H. MEYERS and W. B. PATTISON. U. S. 1,420,201, June 20.  $\text{NH}_3$  is oxidized to form N oxides by mixing it with air and catalyzing the mixt. with V oxide on a carrier of alumina made from alunite, at a temp. of 650–850°.

**Barium hydroxide.** C. DEGUIDE. Can. 220,335, July 4, 1922.  $\text{SiO}_2 \cdot 3\text{BaO}$  is treated with water to produce  $\text{SiO}_2 \cdot \text{BaO}$  and  $\text{Ba}(\text{OH})_2$ . The  $\text{SiO}_2 \cdot 3\text{BaO}$  is regenerated by treating the  $\text{SiO}_2 \cdot \text{BaO}$  with  $\text{BaCO}_3$ . Cf. C. A. 16, 1838.

**Ammonium formate.** S. A. AANNERUD. Can. 220,860, July 11, 1922.  $\text{Ba}(\text{CN})_2$  is treated with  $\text{H}_2\text{O}$  and  $\text{CO}_2$  under pressure and an elevated temp. to obtain  $\text{BaCO}_3$  and  $\text{HCOONH}_4$ .

**Arsenic trichloride.** L. H. MILLIGAN. U. S. 1,421,978, July 4.  $\text{AsCl}_3$  is made by heating  $\text{As}_2\text{O}_3$  with a C catalyzer, CO and Cl at 250°.

**Bleaching powder.** E. T. LADD and E. C. SPEIDEN. U. S. 1,421,503, July 4. A screened bleaching powder is prepd. from lime largely freed from its smaller particles before chlorination. Cf. C. A. 16, 1840.

**Alumina from low-grade bauxite or clays.** R. S. SHERWIN. U. S. 1,422,004, July 4. A sintered unfused alumina, silica-lime-soda mixt. obtained from bauxite or clay, lime and  $\text{Na}_2\text{CO}_3$ , NaOH or NaCl is leached to dissolve Na aluminate; this soln. is heated under pressure to ppt.  $\text{SiO}_2$  and alumina is recovered from it.

**Purification of zinc solutions.** S. FIELD. Can. 220,465, July 4, 1922. Zn solns. are purified from foreign metals prior to electrolytic deposition by treatment with a finely divided metal more electropositive than the impurities to be removed in the presence of a salt of Hg. Cf. C. A. 15, 3544.

**Cyanogen compounds.** H. MEHNER. Can. 220,587, July 4, 1922. The vapor of an alkali metal together with pulverized combined alkali metal, of such nature that no reaction can occur between the free and combined alkali metal, are caused to react with C and N. The process is particularly advantageous when operated on a large scale when the loss of heat by radiation is comparatively small, substantially below the amt. of heat evolved by the exothermic combination of the components.

**Removing phosphorus from vanadium solutions.** A. N. ERICKSON. U. S. 1,421,191, June 27. P is pptd. from V solns. as phosphate by adjusting the H-ion concn. of the soln. by use of NaOAc or  $\text{Ca}(\text{OAc})_2$  and then heating to 60–100°.

**Removing iron from aluminium salt solutions.** T. MEJDELL. U. S. 1,421,804, July 4. Solns. contg. Al salts such as nitrate solns. are freed from Fe by adding  $\text{CaCO}_3$  or other substance which will neutralize the acid liberated by hydrolysis but in a quantity which will not neutralize all the acid, and heating with  $\text{Fe}_2\text{O}_3$  to effect pptn. of Fe.

**Melting sulfur.** H. S. DAVIS and R. F. BACON. U. S. 1,421,416, July 4. Solid S is brought into contact with the surface of a heated inclined Al retort bottom and the S is conducted away as it gradually melts.

**Rectifying argon.** R. WUCHERER and F. POLLITZER. U. S. 1,420,802, June 27. The pat. relates to methods of effecting heat interchange in rectifying mixts., such as liquid air, to recover A.

**Heat-interchange system for liquefying air.** H. N. DAVIS. U. S. 1,420,625, June 27.

**Sulfur burner.** A. G. HINZKE. U. S. 1,421,232, June 27. S flows from a melting kettle downward over a series of superposed plates in a serpentine or zig-zag path and vapors and gases escape through a central vertical pipe.

**Artificial graphite.** T. F. BAILY. U. S. 1,420,512, June 20. A bath of superheated molten Fe is satd. with C, poured into a closed cooling chamber, sufficiently cooled to throw the surplus C out of the bath in the form of graphite and the molten Fe is withdrawn.

**Coating granules of soda-lime.** C. P. MCNEIL. U. S. 1,421,271, June 27. NaMnO<sub>4</sub> is applied as a uniform coating on granules of soda-lime for use as a gas absorbent in gas-masks.

**Flexible micanite.** FUKUYARÔ MIYASHITA. Jap. 39,570, Aug. 18, 1921. Mica is treated with a binder prepd. from linseed oil, shellac, rosin, camphor oil and alc., dried and pressed. It may be hardened by heating at 300-400°.

**Decomposing difficultly soluble substances.** H. D. RANKIN. Can. 220,395, July 4, 1922. Difficultly sol. materials such as ores, concentrates, etc., are rendered sol. by heating to boiling, in a closed vessel, the material and sufficient H<sub>2</sub>SO<sub>4</sub> thoroughly to wet it. Cf. C. A. 15, 737.

**Friction facing material.** F. C. STANLEY. U. S. 1,420,882, June 27. Asbestos pulp is mixed with a sulfurizing agent, satd. with a binder such as linseed oil and then baked at a vulcanizing temp. U. S. 1,420,883 relates to a method of satg. blanks of asbestos fabric with a soln. formed of linseed oil, toluene and Pb resinate, followed by heating to effect oxidation of the binder. Cf. C. A. 16, 2203, 2761.

**Mixture for uniting pipe fittings and the like.** H. BURROWS. U. S. 1,420,908, June 27. Gum shellac, gum mastic and pine resin are dissolved in MeOH, mixed with a separately prepd. soln. formed of gum copal, gum amine, Chinese wood oil, linseed oil and petroleum naphtha and with powdered Al.

**"Antifouling" coating composition.** G. D. COLEMAN. U. S. 1,421,914, July 4. An antifouling compn. adapted for use on ships' bottoms is formed of hydraulic cement 100, Cu ore or concentrate 108, sand 50, mineral fiber 8, Ca(OH)<sub>2</sub> 8, paraffin 5 and CuSO<sub>4</sub> or Cu(OAc)<sub>2</sub> 6 parts.

**Light-diffusing composition.** L. W. EBERLIN and S. E. SHEPPARD. U. S. 1,421,924, July 4. A light-diffusing compn. adapted for coating glass to be used instead of ground glass in cameras is formed of rice starch 15-20, H<sub>2</sub>O 200-300 and strong water-glass soln. 100 parts.

**Fire-extinguishing composition.** G. E. FERGUSON and L. E. ECKELMANN. U. S. 1,421,436, July 4. Solns. are formed (a) from NaHCO<sub>3</sub> and Na<sub>2</sub>CO<sub>3</sub> and (b) from Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> and FeCl<sub>3</sub>; these are mixed to form a foam-retentive product contg. a ppt. of Al and Fe hydroxides.

**Fire-extinguishing solution.** L. E. ECKELMANN. U. S. 1,421,428, July 4. Mixed polychlorinated hydrocarbons including CCl<sub>4</sub> and emulsifying substances are used with foam-producing agents, e. g., NaHCO<sub>3</sub> and Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>.

**Fire-extinguishing composition.** J. B. MILLER. U. S. 1,421,527, July 4. A mixt. of NaHCO<sub>3</sub>, Ca(OH)<sub>2</sub>, SiO<sub>2</sub>, NaCl, H<sub>2</sub>SO<sub>4</sub> and HCl is heated to drive off moisture and prepare a fire-extinguishing compn.

Condensation products of formaldehyde and phenols in particular the cresols. NAAMLOOZE VENNOOTSCHAP UTRECHTSCH E CHEMISCHE INDUSTRIE. Holl. 3,742, Sept. 15th, 1919. Transparent condensation products from a mixt. of equimol. quantities of purified cresol or phenol and 40% aq. HCHO with at most 0.5% fixed alkali hydroxide as catalyst are prepd. by distg. off, under normal pressure, all the water used for soln. and half the H<sub>2</sub>O formed in the condensation. To the residue is added 20 vol. % of the original vol. of MeOH and EtOH; this is then mixed and half the alc. distd. off; subsequently the residue is poured into molds and these are dried in a drying chamber through which passes a current of air. The drying is begun at 60° and is gradually increased to 115 or 120° or higher. A hardened and non-fusible product is formed.

### 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

The decomposition of the glass of ancient windows in the church of Thann. M. BATTAGAY, G. HUGEL AND TH. VOLTZ. *Bull. soc. ind. Mulhouse* 88, 27–30(1922).—The glass consisted of a white and a red layer, the outer surface of the latter being covered with small, whitish, irregular cavities. The white substance in the cavities was shown to be CaCO<sub>3</sub> resulting from the slow decompn. of the glass under the action of light and humidity. The glass contained only 65.5% SiO<sub>2</sub>. The alk. of the glass decreased its stability and the oxides (of Fe, Al, Cu, Mn, and Zn) which colored it acted as catalyzers to hasten the decompn. A. P. C.

Pyrex glass. OSKAR LECHER. *Chem.-Ztg.* 46, 460–70(1922).—An analysis is given as follows: SiO<sub>2</sub> 80.71, B<sub>2</sub>O<sub>3</sub> 10.47, Al<sub>2</sub>O<sub>3</sub> 3.55, CaO 0.70, MgO 0.57, Na<sub>2</sub>O 4.14. A similarity is claimed to the German glass 59 III. J. B. PATCH

The movement of molten glass in pots. H. W. HESS. *Glass Worker* 41, No. 40, 11(1922).—During the melting of a filling of batch and cullet there is a positive motion of the mass after fusion has proceeded to a certain extent, much the same as the water in a boiler flows in a positive direction, due to the point of max. heating and the evolution of gases. Unequal heating of the pot may cause a circulation of glass which has been contaminated by the pot clay and thus spoil the melt. J. B. PATCH

The composition and micro-structure of clays and their fusibility at high temperatures. LEON BERTRAND. *Ceramique* 25, 153–7(1922).—The relation between Al<sub>2</sub>O<sub>3</sub> and fusibility of 101 clays was studied:

% Al <sub>2</sub> O <sub>3</sub>	No. of clays.	Softening temps.	% Al <sub>2</sub> O <sub>3</sub>	No. of clays.	Softening temps.
39	1	....–1840 <sup>a</sup>	25	5	1450–1790
38	1	....–1850	24	4	1450–1800
37	1	....–1830	23	8	1390–1790
36	3	1790–1830	22	7	1440–1790
35	2	1790–1800	21	3	1270–1730
34	4	1810–1830	20	3	1120–1770
33	7	1670–1810	19	1	....–1450
32	2	1750–1810	18	1	....–1720
31	6	1670–1810	17	1	....–1650
30	3	1700–1790	16	4	1160–1710
29	5	1690–1790	15	1	....–1650
28	7	1430–1810	14	2	1460–1690
27	7	1500–1770	12	2	1390–1670
26	9	1470–1770	8	1	....–1650

The clays were classified into 3 groups: (1) over 29%  $\text{Al}_2\text{O}_3$  (over 32% for fired clays). All in this group were fireclays softening above 1650°. (2) 20-28.9%  $\text{Al}_2\text{O}_3$  (21.53-2%  $\text{Al}_2\text{O}_3$  for fired clay). This group consisted of 53 clays softening between 1120-1810°, and 39 of these soften above 1650°. (3) less than 20%  $\text{Al}_2\text{O}_3$  (less than 21.5%  $\text{Al}_2\text{O}_3$  for the fired clay). This group contains 13 clays which soften between 1160-1710°, of which 7 soften above 1650°. A minimum  $\text{Al}_2\text{O}_3$  content should be specified for clay refractories.

H. G. SCHURRCHT

**Physical chemistry and ceramics.** E. W. WASHBURN. *J. Franklin Inst.* 193, 749-73(1922).—Sections are devoted to: colloid chemistry and ceramics; heterogeneous equil. at high temps. including the dissociation of kaolin and phase-rule diagrams; properties of silicate solns. at high temps. including soly. of gases, viscosity, density, and elec. cond.; high temp. calorimetry; and standard methods of testing ceramic materials.

JOSEPH S. HEPBURN

**Clay and fullers' earth.** New Zealand. P. G. MORGAN. *New Zealand J. Sci. Tech.* 2, 119(1919).—At least 3 satisfactory sources of fullers' earth have been discovered—one at Glen Massey, Waikato district; another at Croydon, Near Gore; and the third at Hokonui, Southland. Many other clays have been found to possess considerable clarifying power—some exceptionally good quality for use as fireclay and some valuable for porcelain.

O. P. R. O.

**Illinois fireclays.** C. W. PARMLEE AND C. R. SCHROYER. *Illinois State Geol. Surv.*, Ext. from Bull. 38, 149pp. (1921).—A proposed new classification of clays according to use includes: I, clays burning white or cream colored, not calcareous; IA, open burning, porous at cone 15; IB, dense burning, non-porous or nearly so at cone 10-15; IC, dense burning, non-porous or nearly so at cone 5-10; II, buff burning clays; IIA, refractory; IIB, non-refractory; III, clays burning red, brown, or other dark color; IIIA, open burning, not attaining low porosity until near or at the fusing point; IIIB, dense burning with a more or less extended vitrification range; IV, clays burning dirty white, cream or yellowish white. Further subdivisions are given and the typical uses for the different classes are given. The various types of clays are described and methods of conducting the physical tests are detailed. The geology of Illinois clays is reviewed and many deposits are described. Judged by their physical properties the samples are classified as follows: refractory clays showing a porosity of 5% or less at cone 9 or under, 20; refractory clays showing porosity of over 5% below cone 9, 30; stoneware clays, 48; architectural terra cotta clays, 53; sewer pipe clays, 9; face brick clays, 45; common brick, tile, etc., clays, 10; sanitary ware clays, 48. The same clay may appear in more than one of the above classes.

C. H. KERR

**The making of clay brick.** CH. BRAILLION. *Rev. mat. constr. trav. pub.* 152, 74B(1922).—B. refutes the assertion that lime-silica brick cannot be made with argillaceous sands. Sands contg. up to 20 % clay were mixed with slaked lime, and made into good brick, without any difficulty. A mixt. of pure clay and lime gave a resistant product. Special precautions have to be taken when pure sand and clay are used with the lime.

LOUIS NAVIAS

**Manufacture of culinary ware.** F. BIGOT. *Rev. mat. constr. trav. pub.* 151, 53B-54B, 152, 68B-71B(1922).—The making of culinary ware from clays found at Vallauris, Switzerland is described. Chemical analyses of the clays found at different depths are given.

LOUIS NAVIAS

**The grinding and preparation of raw materials in the whiteware industry.** B. WILDE. *Keram. Rundschau* 30, 167-8(1922).

H. G. SCHURRCHT

**The field of porcelain glazes maturing between cones 17 and 20.** ROBT. TWELLS, JR. *J. Am. Ceram. Soc.* 5, 430-9(1922).—The typical glaze formula used was:  $0.3 \text{ K}_2\text{O}$ ,  $0.7 \text{ CaO}$ ,  $x \text{ Al}_2\text{O}_3$ ,  $y \text{ SiO}_2$ . The  $\text{Al}_2\text{O}_3$  was varied from 0.8 to 1.6 and the  $\text{SiO}_2$  from 6.0

to 16.0. Test glazes were applied to green porcelain discs and fired to cone 17,  $\frac{1}{4}$  down also to cones 18, 19 and 20, down, in commercial kilns. The best glazes were found between these limits: clay, 21.9-27.2%; flint, 40.8-51.8%; feldspar, 17.2-23.6%; whitening, 7.2-10.0%. In general the  $Al_2O_3$  should = 0.3 plus  $\frac{1}{12}$  the  $SiO_2$  equivs.

C. H. KERR

**Modern handling methods in the manufacture of electrical porcelain.** G. L. MONTGOMERY. *Chem. Met. Eng.* 27, 59-62(1922).—The porcelain plant of the Square D. Co., Peru, Ind. is described. The complete handling system is described. Hand lift trucks, belt conveyors and gravity conveyors are used.

C. H. KERR

**The use of forced draft for terra cotta kilns.** J. L. CARRUTHERS. *J. Am. Ceram. Soc.* 5, 449-54(1922).—The advantages are (1) 20% saving in burning costs, (2) better control of furnace gases and temp. and (3) uses less skilled help.

C. H. KERR

**Stability and design of a kiln stack.** T. W. GARVE. *J. Am. Ceram. Soc.* 5, 455-67(1922).—Practical points in stack design are covered.

C. H. KERR

Derry feldspar quarry (DAVIS) 8.

**Glass.** E. C. SULLIVAN and W. C. TAYLOR. Can. 220,748, July 11, 1922. A glass having a linear expansion coeff. of more than 0.000012 and a hardness of 640° contains  $SiO_2$  42, soda 19, potash 5, BaO 19, and  $Al_2O_3$  15%. Cf. C. A. 15, 1608; 16, 1644.

**Glass.** W. C. TAYLOR. Can. 220,441, July 4, 1922. A glass contg.  $SiO_2$ ,  $B_2O_3$ ,  $Li_2O$  and  $Al_2O_3$  has a coeff. of expansion of less than 0.0000056.

**Non-shatterable glass.** O. S. MARCKWORTH. U. S. 1,421,974, July 4, Assembled laminas of glass and celluloid are immersed in a soln. of fusel oil, camphor and methyl salicylate at a temp. of 24-35° and the laminas are subjected to pressure together and more highly heated in the soln.

**Hollow glass articles.** E. FRANK. U. S. 1,420,996, June 27. A long clear glass tube is coated with opaque material at intervals preparatory to reheating and blowing to form incandescent lamp bulbs or similar articles.

**Melting glass.** R. GOOD. U. S. 1,421,210-11, June 27. Mech. features.

**Silica brick.** O. REBUFFAT. U. S. 1,420,284, June 20. Silica brick of very nearly const. vol. and of a d. of 2.27-2.30 is prepd. by adding a phosphate, e. g., Ca phosphate, contg.  $P_2O_5$  to the amt. of 0.45% of the  $SiO_2$  used, and heating to 1300-1350° for 8 hrs. to transform quartz into allotropic forms of  $SiO_2$  of lower d.

**Weatherproofing clay.** W. H. ALLEN. U. S. 1,421,888, July 4. The capillarity of the surface of an unbaked clay article is destroyed by pptg. Ca silicate in its interstices.

**Artificial corundum.** H. A. RICHMOND and R. MACDONALD. Can. 220,855, July 11, 1922. An abrasive material contg. less than 0.6% Ti, 0.5-2%  $SiO_2$  and 0.3-2% FeO is produced by melting impure  $Al_2O_3$  substantially free from  $TiO_2$  in the presence of Fe and reducing part of the  $SiO_2$  and FeO without materially reducing the  $TiO_2$ , then allowing the mass to cool slowly. Cf. C. A. 16, 2083.

**Porcelain.** C. C. TREISCHER. Can. 220,737, July 11, 1922. An elec. insulating material consists of a fired mixt. of clay 219,  $SiO_2$  35, feldspar 144 and beryl 130 parts.

## 20—CEMENT AND OTHER BUILDING MATERIALS

C. N. WILEY

**Investigation of sulfide cement.** H. F. CLEMMER. *Engr. Contr.* 58, 16(1922).—A cement high in sulfide content due to incomplete combustion in the kiln was compared



with a normal cement. In almost every case the sulfide cement was lower in strength.

J. C. WIRR

**Lime-silica-iron oxide.** H. KÜHL. *Zement* 10, 361-4, 374-6(1921).—Alumina is not an essential component of hydraulic cements. The production of cements rich in iron oxide requires the presence of silica in a highly reactive form. The sintering of such cements is similar to that of port. cement. The hydraulic constituent is tri-calcium silicate. The area occupied by cements rich in iron oxide in a triaxial diagram of the system: lime-silica-iron oxide is in nearly the same position as that of the port. cements in the system: lime-silica-alumina.

J. S. C. I.

**Hydraulic setting properties of basic blast-furnace slags.** W. KREBS. *Zement* 11, 1-3, 15-17, 40-4(1922).—A long series of expts. and a study of the work of previous investigators have shown that all basic blast-furnace slags in a glassy, granulated state can be converted into hydraulic cements by the addition of alkali minerals and gypsum. Such cements harden better than is required by the (German) standard specification, and they are unaffected by 3 months' storage.

J. S. C. I.

**Behavior of concrete in solutions of ammonium salts.** R. GRÜÑ. *Zement* 10, 425-6(1921).—Concrete should be protected from  $\text{NH}_4$  salts, which have a detrimental action on it similar to that of acids, the acid radicals in the salts combining with lime, forming sol. salts and liberating  $\text{NH}_3$ .

J. S. C. I.

**Tests on absorptive qualities of concrete blocks.** STANTON WALKER. *Eng. News-Record* 88, 282-84(1922).—The absorption varies inversely with the strength. The absorption is increased by using more water in the mix, and decreased by using coarser aggregates, increasing the quantity of cement, or storing specimens in a moist place immediately after molding. The relation between density of concrete and absorption depends on conditions. By keeping the quantity of cement const., the absorption decreases as the density increases. By varying the quantity of cement and keeping other factors constant, absorption decreases as the density decreases. J. C. WIRR

**Calcium chloride in concrete highway construction.** B. H. PIERMEIER AND H. F. CLEMMER. *Eng. News-Record* 88, 409-11(1922).—The use of  $\text{CaCl}_2$  for curing concrete in highway construction is discussed. Satisfactory results are obtained by using 3 lb. of the dry chemical per sq. yd. of surface. Beneficial results are obtained during the first 24 hrs. and if the  $\text{CaCl}_2$  is washed off by rain afterwards, no serious loss is sustained.

J. C. WIRR

**The determination of tar acids and tar bases in road drainage and mud.** J. J. FOX AND A. J. H. GAUGE. *J. Soc. Chem. Ind.* 41, 173-7T(1922); cf. C. A. 14, 3041.—Because of the complexity of coal-tar residue such as is used for surfacing roads, and because of the absence of characteristic reactions for most of the constituents, estn. in road drainage of tar *per se* is not possible. The tar acids, if isolated, can be accurately detd. colorimetrically as azo dyes formed in alk. soln. with diazosulfanilic acid, with solns. of cresols, xylenols, or  $\beta$ -naphthol as standards. Since many vegetable extractives give colors with the diazo soln., some means of sepg. the tar acids must be used. Steam distn. is not wholly satisfactory, since the sepn. is not complete, but extn. of the drainage or mud with  $\text{CHCl}_3$  and extn. of the  $\text{CHCl}_3$  with 20% NaOH gives a complete sepn.; the diazosulfanilic acid test is applied to an aliquot of the NaOH ext. Tar bases can be extd. from the drainage, previously made alk., with  $\text{CHCl}_3$ ; this soln. is extd. with acid. The acid is neutralized and extd. with  $\text{CHCl}_3$ , and the  $\text{CHCl}_3$  layer added to a little picric acid in a carefully weighed evapg. dish. The  $\text{CHCl}_3$  is evapd. at  $70^\circ$ , and the gain in wt. represents the tar acids present. Solns. of small quantities of tar acids and bases, if in non-sterile  $\text{H}_2\text{O}$ , should be analyzed as soon as possible, to avoid loss by biol. change; in 1 case the amt. of tar acids present diminished in 2 days to 25% of the original value.

DONALD W. MACARDLE

**Resistance of cement mortars to abrasion.** H. NITZSCHE. *Zement* 11, 65-8, 79-81, 99-102(1922).—Mortars were made with 3 port. cements, 2 iron port. cements, and 3 blast-furnace slag cements, with several kinds of sand, quartz, etc., in various proportions. The test-pieces after 31, 45, 52, 66, 90, and 111 days, either plain or water-proofed, were subjected to the action of a normal grinding wheel, fused corundum being used as abrasive. The blast-furnace slag cements behaved the best, while the iron port. cements were the least resistant to abrasion. The hydraulic modulus appeared to be important in connection with the abrasion of the port. and iron port. cements. There appears to be no connection between the resistance to abrasion and the kind of sand used.

J. S. C. I.

**Plastic bituminous roofing composition.** K. L. BINKLEY. U. S. 1,418,905, June 6. Coal-tar pitch is mixed with 11% its wt. of  $MgCO_3$  to raise its m. p. and render it more suitable for use on sloping roofs exposed to the sun's rays.

**Utilizing waste heat of cement-kiln gases.** J. E. BELL. U. S. 1,421,386, July 4. Cement-kiln flue gases contg. a considerable amt. of O are treated with finely divided liquid or solid fuel such as coal proportioned to the amt. of free O in the gases to increase the temp. of the gases by its combustion and the heated gases are then utilized for heating steam boilers or the like.

**Composition for paving or building blocks.** G. S. and C. W. WRIGHT. U. S. 1,421,751, July 4. Molded building blocks or the like are formed from a mixt. of fire-clay 15, lime water 5, NaCl 5, asbestos cement 25, sand 25 and graphite 25 parts.

## 21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

**Pulverized-fuel plant with high efficiency.** ANON. *Elec. World* 80, 27(1922).—Two tests in a large power plant, at boiler ratings of 157.4% and 204.2%, showed efficiencies of the boiler, furnace, superheater, and economizer, based on coal as received, of 89.3% and 89.001%, resp. Operation of a powdered-fuel plant and a stoker plant, each designed on the most approved plans for its respective type, showed cost of maintenance and operation equal, and efficiencies favoring the former by 5%. Pulverized coal offers: continuously high thermal efficiency, flexibility of furnace control, almost complete elimination of banking loss, and utilization of otherwise waste fuels.

W. H. BOYNTON

**Influence of structure on the combustibility and other properties of solid fuels.** E. R. SUTCLIFFE AND E. C. EVANS. *J. Soc. Chem. Ind.* 41, 196-208T(1922).—See C. A. 16, 2588.

E. H.

**Formation and chemical structure of coal.** F. FISCHER. *Naturwissenschaften* 9, 958-65(1921); *J. Soc. Chem. Ind.* 41, 207A.—A résumé is given of the author's earlier work on this subject (C. A. 15, 1610). In reply to Erdmann's criticism (C. A. 15, 3386) that the clearly visible cell structure in coal is contrary to the author's lignin theory, he states that the objection cannot be maintained, since the wood structure was still visible in the lignin obtained by Willstätter and Zechmeister (cf. C. A. 7, 2412) from wood.

C. C. DAVIS

**Development of electrical conductivity in coal and its variation as a result of heating.** F. FISCHER AND G. PFLEIDERER. *Ges. Anhandl. Kennl. Kohle* 4, 394-408(1919); cf. Sinkinson, C. A. 16, 1656.—Coal, peat, lignite, and wood when carbonized all develop an appreciable elec. cond. at the same temp., viz., 700-50°. The change of cond. as a result of heating was explored up to a temp. of 1100°. The temp. coeff. of cond. was greater with the moderately heated specimens than with the more highly heated speci-

mens. The low-temp. (up to 600°) carbonization products of the different fossil coals were all in the same condition as regards elec. cond. The results suggest a means for distinguishing between low and high temp. cokes, for detg. their temp. of carbonization, and for controlling the uniformity of heating in the charge of coke ovens.

J. S. C. I.

**Resins in bituminous coal.** R. V. WHEELER AND R. WIGGINTON. *Fuel* 1, 10-4 (1922).—There is little doubt that the true resins (mixts. of resin acids, resin esters, and resenes) occur in bituminous coal, although their presence is not so easy to detect as in the case of peat, lignite, and coals in a lower state of geological formation. What have been described as "resin bodies" by many writers may in some cases not be true resins. Resins occurring in bituminous coal differ from those of modern formation, having undergone changes which have caused them to lose, to a large extent, their soly. in alc., ether, etc. Other changes have altered the compds. present, but have allowed the portions so changed to retain their soly. Summaries of the effect of various solvents on a Westphalian coal are given (cf. Siepmann, *Z. Berg. Hütten Salinemo* 36, 28(1891)). Samples of what appeared to be resins have been obtained from British bituminous coals, in which they occur as layers, reddish brown and transparent when in thin flakes. Tests indicate that these inclusions are true resins.

J. S. C. I.

**Determination of volatile matter in coal.** G. DELMARCEL AND E. MERTENS. *Bull. fed. ind. chim. Belg.* 1, 5-27, 75-83(1921).—Results obtained by the method of the Am. Coal Comm. (*J. Am. Chem. Soc.* 21, 1116-32(1899)) are constantly high, owing to the combustion of the coke after the evolution of the volatile matter is complete, and the longer the heating is continued after disappearance of the flame the more inaccurate will the result be. If loss of wt. be plotted as ordinates against time as abscissas during carbonization, a graph is obtained which can be divided into 4 well-defined portions, viz., a preliminary heating period, extending over some 10-20 secs., during which the moisture in the coal is driven off, and during which combustion may take place, but to a degree less than the exptl. error; a second rectilinear portion in which the amt. of volatile matter evolved is proportional to the time, and which is called the "distn. curve;" a third transition period during which the evolution of volatile matter slackens off and combustion commences; and a fourth rectilinear portion, representing combustion of the coke, the loss in wt. being proportional to the time and entirely due to this cause. The true content of volatile matter is arrived at by producing the distn. curve and the line of combustion until they meet, when the ordinate of the point of intersection represents the content of volatile matter. The distn. curve, when produced to meet the horizontal axis, cuts it at a point almost identical with the appearance of a flame at the mouth of the crucible, and this time can be taken and utilized as one of the points necessary to fix the distn. curve. The 3 other points are found by stopping the carbonization before the flame has disappeared, cooling, and weighing the crucible and contents. This gives the second point on the distn. curve. The two points on the line of combustion are obtained by heating a fresh portion of the coal in the crucible until after the flame has died down, then noting the time, cooling, and weighing, and repeating the process for a different period of heating. This method is known as the "Three Point" method. For practical purposes the true value can be obtained within 0.2% by taking two observations on the line of combustion and producing this line to meet the vertical axis, when the point of intersection gives the percentage of volatile matter. This is known as the "Two Point" method and is sufficiently accurate for industrial work. The procedure recommended is as follows: 1 g. of the finely pulverized coal is weighed into a Pt crucible, 3 cm. high and 3 cm. wide at the mouth, provided with a well-fitting lid, which is supported on a triangle of fine Pt wire, in such a manner that the base of the crucible is 3 cm. above the opening of the Bunsen burner, which should give a flame 18

cm. high. The crucible is heated for 5 min., cooled, and weighed, the loss in wt. being expressed as a percentage of the weight of the original coal ( $y_1$ ). The crucible and its contents are then heated for another 5 mins., cooled, and again weighed, and the total loss in wt. is again expressed as a percentage of the wt. of the original coal ( $y_2$ ). The volatile matter is then given by the expression  $x = 2y_1 - y_2$ , the volatile org. matter being obtained by deducting the moisture content of the coal from the figure obtained as above. The original paper should be consulted for details as to the evolution of the equation  $x = 2y_1 - y_2$ . J. S. C. I.

**Determination of calorific value of coal.** F. S. SINNATT AND M. B. CRAVEN. *Lancs. Cheshire Coal Research Assoc., Bull.* 10, 23 pp.(1921).—Formulas for the calcn. of calorific value from the proximate analysis of coal (cf. Goutal, *Compt. rend.* 135, 477-9(1902)) are accurate when dealing with samples from the same seam except when the coal contains Ca or substituted Ca carbonates; the value for one of the samples should be detd. in a bomb calorimeter, the manipulation of which is described in detail. J. S. C. I.

**The significance of fuel losses through incomplete combustion of low-grade coals.** F. KBEL. *Glückauf* 58, 739-44(1922).—Numerous graphs show the relation between the % of ash of the fuel and the unburned fuel, the loss in heat units and CO formation. The most important loss with low-grade coals proved to be the combustible material remaining in the ash. The flue losses and loss through formation of CO are of secondary importance. C. C. DAVIS

**Froth flotation as applied to the washing of industrial coal.** E. BURY, W. BROADBRIDGE AND A. HUTCHINSON. *Trans. Inst. Min. Eng.* 60, 243-53(1920-21); cf. C. A. 16, 1003.—The coal should be crushed in the dry state and passed through a 0.1-in. screen; the employment of water during crushing and for classification as in metallurgical practice is not advisable. A general description is given of a coal crushing, screening, flotation, and drying plant (cf. Jones, C. A. 16, 328). The water used for washing  $C_{10}H_8$  from coke oven gas contains, after sepn. of  $C_{10}H_8$ , sufficient frothing reagents to treat all the coal required for the coke ovens. By adjustment of reagents the low-ash coal can be first sepd. from the bone-coal and shale or clay; about 0.33-lb. of paraffin oil per ton of original coal is then added in the appropriate cell of the flotation machine, whereupon the bone-coal floats and is removed as a sep. product. As this contains 12-15% of ash, it is more suitable for steam raising than for the manuf. of blast-furnace coke. The tailings contain 60-85% of ash, and flow away with the water to a settling ground or Dorr thickener; in some cases they consist of high-grade fireclay. Although pyrites may be concd. by flotation processes, the reagents employed for floating coal are such that the S content of the coal is actually reduced. The washed coal after partial drying is converted into coke contg. 4.8-5.0% of ash and of very high physical strength. It is estd. that the use of this coke for smelting Cleveland ironstone will result in a saving of 2 cwt. of coke and 1.5 cwt. of limestone per ton of pig-iron when compared with the use of coke from modern washery product coal. J. S. C. I.

**The purification of water used in washing coal.** K. IMHOFF. *Glückauf* 58, 776-8 (1922).—Present methods of purifying  $H_2O$  after washing coal with subsequent recovery of the coal sludge are discussed. The most economical processes are based upon sedimentation. The sludge is dried in the air, either in the original settling basins, or in special drying rooms. The dried sediment is mixed with waste coke and burned under the boilers. Settling tanks 2-3 sq. m. area per cu. m. of wash- $H_2O$  per hr. are sufficient to recover the coal as sediment. C. C. DAVIS

**The production and use of montan wax.** KAUSCH. *Z. deut. Oel-Fett-Ind.* 42, 361-2, 394-5(1922).—The literature of montan wax obtained by distg. or extg. brown

coal is reviewed, mainly on the basis of a compilation of patent literature.

P. E.

The action of nitric acid on lignite and humic acid. A. SCHELLENBERG. *Brennstoff-Chem.* 2, 384-6(1921).—Cf. Donath (*C. A.* 6, 2836), Donath and Bräunlich (*C. A.* 7, 1277), Marcusson (*C. A.* 13, 2751) and Fischer and Schrader (*C. A.* 15, 3548). Polemic against Marcusson (*C. A.* 16, 1496).

W. B. V.

Dispersoid chemistry of peat. Dispersoid-chemical changes in peat by steaming under pressure (ten Bosch process). WO. OSTWALD AND P. WOLSKI. *Kolloid-Z.* 30, 119-33(1922); cf. *C. A.* 16, 1495.—The ten Bosch process for removing water from peat, prior to its conversion into briquets for fuel, consists in submitting the peat to steam at 140-60° under the pressure required to obtain such a temp., and the pressure of the column of peat under treatment (cf. U. S. Pat. 1,290,494 (*C. A.* 13, 786) and Brit. pat. 128,064 and *C. A.* 13, 1526). The treatment takes place in an iron tower, 50 cm. diam. and 16 m. high. The peat is forced down the tower by 3 rotary forcing appliances and is treated periodically for 1 min. with steam in the center of the tower. Peat which contains 85-90% of water on entering the tower leaves it with 68-72%, and this on mech. pressing is reduced to 25%. The authors consider that on heating under pressure the peat gels are, in part (mainly the humus gels), peptized and converted into liquid drops, while at the same time another portion of the peat gels is coagulated and converted into a condition poor in water, and capillary and occluded water is set free by the pressure, so that a blackish peat water and the dehydrated peat pulp are produced in the tower.

J. S. C. I.

Power alcohol as a fuel for Egypt. C. W. WOOD. *Cairo Sci. J.* 10, 9-24(1921).—A general discussion. Scarcity of suitable raw material prevents the growth of the alc. industry. It is doubtful if a denaturant can be found sufficiently obnoxious to prevent the drinking of the alc. by some of the native tribes.

L. E. GIBSON

Carburetor adjustment by gas analysis. A. C. FIELDNER AND G. W. JONES. *J. Ind. Eng. Chem.*, 14, 594-600(1922).—To adjust a carburetor by CO<sub>2</sub> analysis of the exhaust the automobile is tested on the road under the different speeds and other conditions to which the machine is normally subjected. The carburetor setting giving the highest CO<sub>2</sub> percentage at the different speeds coupled with flexible operation is chosen as the best. A portable CO<sub>2</sub> indicator for use in road tests is described. Curves showing among other things, the relation of CO<sub>2</sub> percentage to the air fuel ratio and to completeness of combustion, are shown.

H. L. OLIN

Recent research work on the internal-combustion engine. H. R. RICARDO. *J. Soc. Automotive Eng.* 10, 305-36(1922).—R. discusses fuels for internal-combustion engines with reference to mean volatility and detonation.

D. F. BROWN

A consideration of the specific heats of gases from the point of view of their application to industrial problems. EMILO DAMOUR AND D. WOLKOWITZ. *Rev. metal.* 19, 145-61(1922); cf. *C. A.* 15, 2538.—A review of the work of seven leading investigators (Langen, Pier, Bjerrum, Henning and Holborn, and Mallard and LeChatelier). Three have adopted the "explosion" method of M. and LeC., and obtained satisfactory exptl. results, although erroneous calcs. gave different conclusions. M. and LeC.'s method and formula are best and give optimum results for calcg. the economic value of fuels.

W. A. MUDGE

Improving the quality of low-grade gases. WUSSOW. *Z. Sauerst. Stickst.-Ind.* 13, 120-1(1921); 14, 2-6, 16-18(1922).—From gases of low value, including some producer gases, the useful gases such as H and CO can be extd. by a diffusion process, an indifferent gas, such as steam, being passed through the chamber at the diffusion wall in a contrary direction to the other gases. The possibility of using incandescent iron as a diffusion wall is indicated.

J. S. C. I.

A new advance in the gasification of lignite. ERNST ROTH. *Braunkohle* 21, 154-9(1922).—An illustrated description of a new generator for distg. lignite, devised by Goeltz, which overcomes the defects of previous types of rotatory generators. It differs chiefly from previous ones in that it prevents the material from coming to rest or forming clinkers, and in that it removes the ashes mechanically by a special form of grate. This grate consists of annular, concentric bars so arranged that they cover the total cross section of the generator. These bars are spaced to make annular openings, besides which there is a great no. of radial slits. The annular and radial openings have a double object, to serve as channels for the blast, and to act as sieves for ashes. The grate is stationary. The removal of ashes is effected by an S-shaped revolving stirrer or propeller, resting on the grate. The entering blast is so distributed that it enters the generator with a uniform velocity through the grate area. By thus removing the ashes at their source, all tendency to form clinkers is overcome. Expts. were carried out in a Goeltz generator 2 m. in diam. with sieved "Erika" coal analyzing in %: H<sub>2</sub>O 52.48, ash 5.86, C 28.06, H 1.89, S 0.65, O + N 11.06, heating value 2123 cal. per kg. The gas obtained contained in %: CO<sub>2</sub> 10.5, O 0.0, CO 21.3, H 15.8, CH<sub>4</sub> 0.5, heating value 1110 cal. per cu. m. Analysis of the coal ash and gas showed a total loss of C in the process of 4%. 1.54 cu. m. of gas were obtained per kg. of coal. The thermal efficiency of the generator was 80%. The production was approx. three times that of the rotatory generators, and the relative saving in steam was also considerable. An av. of 392 kg. of coal per sq. m. of cross section per hr. was put through the process, compared with 123 kg. in the rotatory generators. C. C. DAVIS

Distillation and gasification of lignite. KONRAD ARNEMANN, *et al.* *Braunkohle* 21, 124-38(1922).—A symposium on the distn. and gasification of German lignites, including modern equipment and some new data. The major problems are now solved. Gas now obtained by means of the Heller generator (German Patent) has a heating value of 1250-1400 cal. per m.<sup>3</sup> and in recuperative and in regenerative firing yields temps. of 1400° and 1600°, resp. New data are given for the Thyssen rotatory oven. This consists of an externally heated tube approx. 20 m. long rotating slowly. By distn. of 100 kg. of tar by this process, 75 kg. of distillate and 25 kg. of pitch are obtained. 28 kg. of the distillate are benzine and oils b. below 250°. Lignite from the Ludwig mines gave per ton: crude tar 90 kg., benzine 15 kg., crude gas 70 m.<sup>3</sup> and coke 250 kg. Distn. of Michel coal contg. 7.6% tar yielded 4% tar. C. C. DAVIS

Carbonization of peat in vertical gas retorts. *Tech. Paper No. 4*, Fuel Research Board, 16 pp.(1921).—Machine-won air-dried peat was disintegrated in a coal crusher and carbonized in the vertical gas retorts described in the previous report (C. A. 16, 1311). Sufficient steam, 6.0-6.5% by wt. of the peat carbonized, was admitted to the base of the retorts to quench the coke. The peat tar required special arrangements for its recovery, as it was lighter than the liquor; the gas leaving the condenser was cooled to 20° and the liquid products issued in the form of a yellow emulsion. The tar sepd. on heating the emulsion to 50°; it set into a semi-solid mass showing crystals of paraffin wax on cooling. The peat as carbonized contained about 20% of moisture and 50% of volatile matter, the throughput per retort per day being 3 tons. With a carbonizing temp. of 980° the gas produced per ton amounted to 14,900 cu. ft. with a calorific value of 325 B.t.u. After supplying gas for heating the retorts 7940 cu. ft. of gas was available for disposal, together with 12.6 gal. of tar, and liquor equiv. to 29.2 lb. of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. At lower temps., 820-75°, the yields were: gas 13,760 cu. ft., or 46.8 therms, coke 5.4 cwt., tar 21.3 gal and liquor equiv. to 24.8 lb. of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> per ton. The sp. gr. of the gas was 0.757, and it contained 18.2% CO<sub>2</sub>; after storage in a holder it contained CO<sub>2</sub> 14.7, C<sub>2</sub>H<sub>6</sub> 3.7, O<sub>2</sub> 1.0, CO 22.0, H<sub>2</sub> 23.8, C<sub>1-3</sub>H<sub>4</sub> 14.4, N<sub>2</sub> 20.2%. The coke contg. 3.96% of volatile matter and 9.98% of ash was considered an excellent fuel for suction

producers. The tar on fractional distn. gave: Up to 170° 2.3%; 170-230° 13.6%; 230-70° 13.6%; 270-310° 24.5%; 310-47° 16.9%; pitch 25.6%. Light spirits were removed by steam distn., refined and distd. up to 170°, the yield being 0.36 gal. per ton of peat. The equiv. of a further 2 gal. of light spirit per ton was recovered by scrubbing the gas. The liquor contained 0.72% of  $\text{NH}_3$ , 0.847% of  $\text{AcOH}$ , 0.163% of  $\text{MeOH}$ , and 0.129% of acetone. J. S. C. I.

**Producer gas from pulverized fuel.** F. S. SINNATT AND L. SLATER. *Fuel* 1, 2-3 (1922).—In suggested processes for the manuf. of producer gas by passing pulverized fuel, suspended in air, into a chamber lined with refractory material, in which the gas is made by the partial combustion of the fuel in air or in a mixt. of steam and air, a difficulty is likely to be experienced owing to aggregation of the coal powder to large particles which would be useless for the purpose of the process. Expts. are quoted and lines of research indicated which may result in overcoming this difficulty. By heating bituminous coal powder for a short time to 420-500° its coking qualities are destroyed although the loss in volatile matter is comparatively small. The fineness of the coal is unaltered by the treatment, and it may then be used in the gasification chamber without larger aggregates being produced. The same coal powder coheres badly if an attempt is made to gasify it without previous destruction of its coking properties. J. S. C. I.

**Study of gas from destructive distillation of a mixture of water-gas tar and coal.** R. L. BROWN. *Chem. Met. Eng.* 26, 363-5 (1922).—A mixt. of 70% of gas coal and 30% of water-gas tar, resulting from the Trent process for cleaning coal (cf. Perrott and Kinney, *C. A.* 15, 3192), was distd. in a gas-retort and an examn. made of the unsatd. hydrocarbons found in the gas after removal of tar and  $\text{NH}_3$ . The gas sample was treated with  $\text{NaOH}$  to remove  $\text{H}_2\text{S}$  and with charcoal to remove oils and vapors, and was then measured and passed through a train of 3 wash bottles contg.  $\text{Br}$  covered by a little water. The wash bottles were immersed in a bath maintained at 5°. The vol. of gas treated was 40 cu. ft. and about 6% of this was adsorbed by the  $\text{Br}$ . The crude bromides produced were washed with  $\text{Na}_2\text{CO}_3$  and water, dried with  $\text{CaCl}_2$  and fractionated under reduced pressure in an atm. of  $\text{N}$ . The first fraction boiling below 60° at 12 mm. was further fractionated into 5 fractions, which, from a consideration of their phys. properties, were identified as (a) benzene; (b) ethylene dibromide, 87.5%, and monobromopentane, 12.5%; (c) propylene dibromide; (d) butylene dibromides, 90%, and monobromobenzene, 10%; and (e) anylene dibromides with *p*-dibromobenzene. The second fraction boiling up to 125° at 35 mm. consisted of dibromobenzenes, and the residue was a tarry mass from which tetrabromobutane was extd. by ether. The quantities of olefin derivs. were equiv. to 23.10 cu. ft. of  $\text{C}_2\text{H}_4$ , 10.34 cu. ft. of  $\text{C}_3\text{H}_6$ , 2.25 cu. ft. of  $\text{C}_4\text{H}_8$ , and 1.36 cu. ft. of  $\text{C}_5\text{H}_{10}$  per 1000 cu. ft. of gas. J. S. C. I.

**Steam consumption in various ammonia-recovery processes.** A. KRIEGER. *Gas-u. Wasserfach* 65, 17-20 (1921).—Calcns. are given of the total steam consumption involved in  $\text{NH}_3$  recovery by the indirect, semi-direct (Koppers, etc.), and Otto direct process under conditions prevailing in coke-oven and gas-works practice, resp. Conclusion: In the latter case no saving is obtained by any of the more recent processes, the extra power required to force the gas through the saturators counter-balancing the steam otherwise required for distn. In coke-oven practice a considerable saving is possible, owing to the use of blowers of greater mech. efficiency, but this saving is dependent on their maintenance in good condition, and correct proportioning to their work. In the Otto direct process, in which the tar is sepd. at 75°, notwithstanding the temp., a small quantity of liquor charged chiefly with  $\text{NH}_4\text{Cl}$  condenses. If this is run into the saturator an impure sulfate results, and it must be run away or distd. If it is allowed to pass away with the tar, serious corrosion of the tar stills follows. There is, therefore,

little inducement for gas works to adopt direct processes. Even for coke ovens their advantages would disappear were it possible for ammoniacal liquor of a strength similar to that of gas works liquor to be made.

J. S. C. I.

**Recovery of pyridine in ammonium sulfate saturators.** W. GLAUD AND G. SCHNEIDER. *Ber. Ges. Kohlentechn.* 1, 42-3.—Pyridine if present is evolved on heating even strongly acid  $\text{NH}_4$  sulfate solns., and, consequently, in coke-oven practice the greater part of the pyridine content of the gas passes through the saturator unabsorbed. It can only be recovered by washing with cold  $\text{H}_2\text{SO}_4$ .

J. S. C. I.

**The quantitative separation of water and ether from phenolic mixtures obtained in the investigation of phenol products.** H. DITZ. *Z. Angew. Chem.* 34, Aufsatzteil, 634-5(1921).—A review.

C. C. DAVIS

**Determination of naphthalene in tar and tar-oil.** M. HOFSSÄSS, H. HERRMANN AND R. MEZGER. *Gas. u. Wasserfach* 64, 722 3(1921).—In correspondence relating to the method described previously (Mezger, *C. A.* 15, 3201), it is pointed out that:  $\text{H}_2$ , on account of its lower d. and the higher degree of purity of the com. product, should prove more efficient than coal gas as a volatilizing agent; homologs of naphthalene, such as acenaphthene, phenanthrene and chrysene, are also volatilized and pptd. as picrate under the conditions described, but the small quantities present in com. products can usually be neglected; it is doubtful whether the  $\text{H}_3\text{PO}_4$  would retain all the bases present in highly basic fractions of tar; the time required for the operation, i. e.,  $3\frac{1}{2}$  hrs., can often be considerably reduced as the disappearance of the deposit of naphthalene formed at first on the dry bulb marks the completion of the reaction. With slight modifications the method should be suitable for adoption as a standard method of analysis.

J. S. C. I.

**High vacuum distillation plant for lignite tar.** R. NEUMANN. *Petroleum Z.* 17, 1257-9(1921).—A description is given of a large plant which has been in operation for some time for the distn. of tar formed by Mond producers running on lignite. The plant was required to distil the tar down to asphalt in one operation, under reduced pressure, and as the yield of asphalt is small, normal design was impossible on account of insufficient residue remaining in the still to cover the fire-tube. A fire-tube still was essential, as an externally fired still would not be sufficiently strong to withstand the high vacuum (85 to 70 cm.). A horizontal cylindrical still fitted with single fire-tube is used in conjunction with a horizontal cylindrical vessel of equal capacity, situated at a slightly lower level, and heated by the flue from the still. An overflow pipe, inclined downwards towards the auxiliary vessel, connects the latter with the still. A pump works continuously during the earlier part of the distn., drawing the liquid from the base of the auxiliary vessel and discharging it into the top of the still. The capacity of the pump is in excess of the rate of distn. and therefore causes continual circulation. When distn. has proceeded sufficiently to leave the auxiliary vessel empty, the pump is stopped, and distn. completed from the still alone. In plant of this type the auxiliary vessel may, if necessary, be larger than the main still, and oils yielding only small quantities of residue may be distd. in one operation. Thermometer readings show that the stills differ only slightly in temps., and fractionation during distn. is satisfactory. The effective circulation minimizes the formation of coke, and ensures removal of water with the min. of frothing.

J. S. C. I.

**Equipment for increasing the heat efficiency in tar distillation.** A. THAU. *Glückauf* 58, 744-8(1922).—In tar distn. the heat efficiency can be considerably increased by utilization of the lost heat of the distd. vapors for preheating and dehydrating the tar. This process has so far been in general use only in England. The English process with preheating and dehydration by means of the heat of the distd. vapors is described and illustrated. In principle this consists of 2 vertical stills from the first of which a conden-



ser coil leads through the second still and thence through cooling  $H_2O$ . Both stills contain tar, the second receiving crude tar which is heated and dried by the vapors from the first still. The heated and dried tar is passed intermittently from the second still to the first. Accessories, such as pitch reservoirs, condensers for the  $H_2O$  vapor and distillate, complete the app. The temp. of the predried, preheated tar rises as high as  $150^\circ$  after removal of 4–5%  $H_2O$ . The difference in fuel consumption between this process and a simple distn. for stills of 24 tons capacity and tar contg. 3–5%  $H_2O$  amts. to approx. 36%, and the time of distn. is 0.33 less. A horizontal still of 50 tons capacity for predrying tar is also described. By means of a series of channels situated over the bed of liquid through which the entering tar runs before it flows into the body of tar in the still, all danger of foaming is overcome. A tar contg. 40%  $H_2O$  can be dried and distd. The new horizontal still of Weickel, established at Worms in 1917, is described. The fuel consumption of this is now 1500 kg. of Rhenish lignite briquets per 20 tons of tar contg. 3–4%  $H_2O$ . C. C. DAVIS

Tar distillation. E. V. CHAMBERS. *J. Soc. Chem. Ind.* 41, 178–81T(1922); cf. C. A. 16, 1310.—The advantages of the cascade system for handling tar contg.  $H_2O$  in quantities up to 30% are discussed. DONALD W. MACARDLE

Notes on the communication of S. Ruhemann on "Lignite producer tar." FRANZ FISCHER. *Ber.* 55B, 505–6(1922); cf. C. A. 16, 636.—Polemic. D. W. MACARDLE

The structure of coke. H. D. GREENWOOD AND J. W. COBB. *J. Soc. Chem. Ind.* 41, 181–8T(1922).—Sp. gr. detns. were made on various samples of coke in 3 ways: (1) 60-mesh powder ("coke material"); (2) fragments of av. diam. of 3 mm. ("material + closed pores"); and (3) 1 large lump ("material + all pores"). Material coked at  $550^\circ$ , though less in wt. by 31% than the original coal, had a vol. 2.8% greater; the difference between (1) and (3) showed that 45% of the vol. of the coke was pores. Heating to  $850^\circ$  caused a further loss in wt., but the porosity was increased to 52.5%; the cells were larger than before, but of denser and harder material. Further heating to  $1100^\circ$  caused little more loss in wt., but the porosity decreased to 45.8%, showing that the cells had decreased in size and the cell walls thickened. This is probably the principal cause of the increased strength of high-temp. coke. DONALD W. MACARDLE

Purification of anthracite (SCHUCHARDT) 4. Carbon ratios of coals in West Virginia oil fields (RGER) 8.

Liquid fuel mixture. E. A. CHARBONNEAUX. U. S. 1,420,622, June 27. A fuel adapted for use in internal-combustion engines is formed of turpentine 1, ether 2 and alc. 3 parts.

Liquid fuel. M. C. WHITAKER. U. S. 1,421,879, July 4. A fuel mixt. adapted for use in internal-combustion engines is formed of kerosene 90–92 and  $EtOAc$  10–8%.

Purifying coal. W. E. TRENT. U. S. 1,420,163, June 20. Coal is reduced to an impalpable powder to detach carbonaceous and non-carbonaceous material and the detached constituents are then sepd. from each other by emulsification and hydraulic classification. U. S. 1,420,164 relates to mixing the finely divided coal with a selective sepn. agent such as a hydrocarbon oil which forms an "amalgam" with the C and excludes the ash-forming material. U. S. 1,420,165 relates to the distn. of this "amalgam" to obtain by-product oils and a carbonaceous residue.

Montan wax from coal. H. PLAUSON. Can. 220,516, July 4, 1922. The coal is emulsified in hot water in a high-speed disintegration operation and the emulsion is sepd. from the earthy material.

Low-temperature distillation of coal. JAMES SWINBURNE. Can. 220,705, July

11, 1922. The coal is so slowly heated in bulk by metallic resistance elements which subdivide the charge that uncracked aliphatic oils are produced.

**Furnace for distilling coal at low temperature.** SHIKANOSUKE MURAYAMA and THE MITSUI KOZAN KABUSHIKI KAISHA (the Mitsui Mining Co.). Jap. 39,546, Aug. 16, 1921.

**Plant for burning pulverized solid fuel.** A. ASSERETO and L. CACCIOPPOLI. U. S. 1,420,904, June 27. A cyclic air circulation is maintained through a fuel and air mixing chamber.

**Carbonaceous product from rotted coal.** H. RODMAN. U. S. 1,420,754, June 27. A carbonaceous product adapted for use as a fertilizer or for other purposes is prepd. by dissolving rotted coal in an aq. soln. of  $\text{NH}_3$  to form a thick plastic mass and drying it.

**Stripping illuminants from coal gas by use of charcoal.** F. SODDY. U. S. 1,422,007, July 4. Coal gas is passed in contact with charcoal (not cooled below ordinary temp.) in order to sep.  $\text{CH}_4$ , CO and H from  $\text{C}_{10}\text{H}_8$ ,  $\text{C}_6\text{H}_6$ ,  $\text{C}_2\text{H}_4$  and other illuminants. U. S. 1,422,008 relates to an app. for carrying out this process.

**Retort furnace adapted for distilling straw.** T. R. BLANCHARD and E. B. KENEFFIC. U. S. 1,420,958, June 27.

**Producer-gas plant for use on automobiles.** J. W. PARKER. U. S. 1,420,570, June 20.

**Receptacle for quenching coke.** A. FRÄNKEL. U. S. 1,421,445, July 4. Bars forming an inner receptacle keep the hot coke out of contact with the walls of an outer quenching receptacle. Cf. C. A. 15, 1805.

## 22—PETROLEUM, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

**Petroleum education.** EDWIN DEBARR AND F. W. PADGETT. *Chem. Met. Eng.* 27, 125-7(1922). E. H.

**Artificial petroleum from fish oils. II.** K. KOBAYASHI AND E. YAMAGUCHI. *J. Chem. Ind. (Japan)* 24, 1399-1420(1921); cf. C. A. 15, 2542.—Artificial petroleum has been prepd. from fish oils on the lab. scale, and also on a semi-industrial scale, a flat retort designed by Kobayashi being used. The yield of the petroleum depends upon the kind of fish oil, the construction of the retort, the duration of distn., and the properties of the contact material used, such as Japanese acid clay or fuller's earth. In each case 25 gal. of fish oil was mixed with 180 lb. of granular Japanese acid clay and covered with 150 (or 180) lb. of the new or once used clay. Shark oil (sp. gr. 0.9192, sapon. value 163.6) gave 74% (calcd. on the material used) of distillate (sp. gr. 0.8502, sapon. value 38.2); sardine oil (sp. gr. 0.9272, sapon. value 173.6) 61% of distillate (sp. gr. 0.8600, sapon. value 47.6), and arctic sperm oil (sp. gr. 0.8775, sapon. value 114.2) 64% of distillate (sp. gr. 0.8080, sapon. value 12.2). On fractional distn. the artificial petroleum gave 3.8% of gasoline (b. below  $100^\circ$ , sp. gr. 0.6932), 8.0% of naphtha (b.  $100-150^\circ$ , sp. gr. 0.7428), 6.2% of lamp oil (b.  $150-200^\circ$ , sp. gr. 0.7880), 8.0% of heavier lamp oil (b.  $200-50^\circ$ , sp. gr. 0.8272), and 39.0% of machine oil (b. above  $250^\circ$ , sp. gr. 0.8875). J. S. C. I.

**Artificial petroleum from soy bean, coconut, and chrysalis oils and stearin.** K. KOBAYASHI. *J. Chem. Ind. (Japan)* 24, 1421-4(1921).—A mixt. of the sample and finely powd. Japanese acid clay is charged into an iron retort and covered with the same clay. The retort is gradually heated under the ordinary pressure, the distn. being com-

pleted at about 700°. The product has a greenish fluorescence and an odor very similar to that of the artificial petroleum obtained from fish oils (cf. above). Soy bean oil (sp. gr. 0.9268, sapon. value 192.3) gave 55% of distillate, which was further fractionated into 10% of light oil (b. p. below 150°, sp. gr. 0.7380, sapon. value 7.7), 17.3% of illuminating oil (150–250°, sp. gr. 0.8173, sapon. value 18.8), and 27.7% of neutral and heavy oil (above 280°, sp. gr. 0.8903, sapon. value 22.3). Coconut oil (sp. gr. 0.9294, sapon. value 253.5) produced 54.7% of distillate (sp. gr. 0.8176, sapon. value 83.5), which gave 9.6% of light oil (sp. gr. 0.7679, sapon. value 11.0), 34.7% of illuminating oil (sp. gr. 0.8244, sapon. value 68.1) and 10.4% of neutral and heavy oil (sp. gr. 0.9060, sapon. value 89.3). Chrysalis oil (sp. gr. 0.9256, sapon. value 200.5) gave 56.6% of distillate (sp. gr. 0.8499, sapon. value 41.8); and stearin (m. p. 53°, neutral. value 211) gave 63.4% of distillate (sp. gr. 0.8177, sapon. value 52.2), which gave 11.62% of light oil (sp. gr. 0.7160, sapon. value 5.2, 19.67% of illuminating oil (sp. gr. 0.8041, sapon. value 8.6), and 32.11% of neutral and heavy oil (sp. gr. 0.8668, sapon. value 42.5).

J. S. C. I.

**Preparation of a liquid fuel resembling petroleum by the distillation of the calcium salts of soy-bean-oil fatty acids.** M. SARO. *J. Chem. Ind. (Japan)* 25, 13–24 (1922).—By the dry distn. of 100 g. of the Ca salts of soy-bean-oil fatty acids about 73 cc. of oily distillate and about 8 l. of combustible gas were obtained. The oily distillate has an odor resembling that of cracked petroleum and a pale greenish yellow color with a fluorescence similar to that shown by petroleum. Its characters are as follow:  $d_{15}$  0.8261, I value 117.4, acid value 0.3, refining loss with concd.  $H_2SO_4$  (15% by vol.) and NaOH (sp. gr. 1.155; 5% by vol.) 22.0%, calorific value 9958 cal. The gas contains 2.4% (by vol.)  $CO_2$ , 4.0%  $O_2$ , 18.1% of heavy hydrocarbons, 10.3%  $CO$ , 1.4%  $H_2$ , 50.7%  $CH_4$  and 12.3%  $N_2$ .

J. S. C. I.

**Cracking petroleum.** K. SMOLÉNSKI, S. TUROWICZ AND R. DOBROWESKI. *Przemysl Chem.* 5, 201–20, 237–54 (1921).—Petroleum from Krosno yields aromatic hydrocarbons in quantities approaching those obtained from Baku petroleum. The quantity and quality of the products depend principally upon the temp. of distn., 680–720° being the optimum, and, with a given rate of flow, benzene, toluene, xylene, naphthalene, and anthracene are easily obtained.

J. S. C. I.

**The dracorubin test of hydrogenated compounds.** W. SCHRAUTH AND O. VON KEUSLER. *Auto-Technik* 10, [17], 3–4 (1921); cf. Dieterich C. A. 13, 2831.—The satd. hydrocarbons cyclohexane, methylcyclohexane, dimethylcyclohexane and decahydronaphthalene leave dracorubin test-papers unchanged. The unsatd. hydrocarbons cyclohexene, methylcyclohexene, and tetrahydronaphthalene give the same coloration of the paper or liquid as benzene. The almost complete decolorization of the test-papers given by cyclohexanol and methylcyclohexanol and the glistening upward streaks are characteristic of alcs. It thus appears that satd. hydrocarbons show the benzene (petroleum spirit) characteristics and hydrogenated phenols the alc. characteristics, while unsatd. hydrocarbons show the unchanged benzene characteristics. These results are completely borne out by practical experience with the products as motor fuels.

J. S. C. I.

**Some characteristics of petroleum oils used on Diesel engines.** H. MOORE. *Diesel Engine Users' Assoc.* Apr. 7 (1922).—The present-day knowledge of petroleum oils is insufficient to allow of the prediction of the behavior of any fuel oil on an engine as an exact function of its analysis, without reference to past experience. The closed flash point is of no use for detg. the behavior of fuel oil in an engine. The viscosity affects the thermal efficiency of the engine, the less viscous oils showing the greater efficiency, and advantage of this fact should be taken by preheating fuel supplies on a more elaborate scale than is usual. The cold test shows the presence of paraffins, which

interfere with the settling of ash and water, leading to trouble with engines. The oil should have a cold test below  $0^{\circ}$ . The heat value does not vary greatly, and is mainly required for detns. of over-all thermal efficiency. Detn. of the ultimate compn. is not necessary. The S content appears to have little influence on the behavior of the oil in engines. It is only necessary to ascertain the spontaneous ignition temp. when a new type of fuel is being investigated. The ash content is of the greatest importance, as engines are very sensitive to the presence of ash, and various specifications give a max. limit of ash from 0.05% to 0.08%. Soft ashes, such as Na sulfate, generally given by tar oils, are not nearly so injurious as the ashes contg. iron and silica yielded by petroleum oils, the ash from petroleum being more abrasive. The ash accumulates in the lubricant adhering to the cylinder walls and abrades the metal surfaces. Mech. impurities, usually leaves or material from wrappers used on barrel bungs, accumulate in the pulverizers of Diesel engines; such impurities are seldom present in residual oils, but occasionally leaves are found in crude oil. A water content of over 1% causes misfiring, leading to smoky exhaust and gummy exhaust valves, together with contamination of the lubricating oil with unburned but partially carbonized fuel oil. The Engler distn. is not necessary with residual fuel oils, but is required when light crude oils are being tested in order to detect the presence of petrol fractions, which cause "bumping" of the engine unless special flame plates are employed. Coke value, and contents of soft asphaltum and hard asphaltum are closely interrelated, but the hard asphaltum is the main cause of carbonization in engines. Certain oils, such as those from Barbados and Comodoro Rivadavia, are rich in soft asphaltum (insol. in alc-ether mixt.), but are comparatively free from hard asphaltum (insol. in petroleum ether). Such oils can be burned with comparative ease, though of very high gravity and high viscosity. The Mexican oils contain a comparatively large quantity of hard asphaltum, and are therefore more difficult to burn than other asphaltic oils of similar gravity. For com. purposes 8 tests are suggested as being of the greatest importance. These are sp. gr., closed flash point, cold test, heat value, ash content, water content, coke value, and content of hard asphaltum. The design of engines greatly affects their capability of burning heavy oils, the 4 predominating factors being speed of engine, compression pressure, max. mean effective pressure at which engine will run, and type of injection (blast air or mech.). A large no. of analyses of petroleum fuel oils are embodied in the paper.

J. S. C. I.

**Methods of determining the calorific values of certain unsaturated hydrocarbons.** Royal Aircraft Establishment Report, No. H. G. 410; *J. Inst. Petroleum Tech.* 7, 339-42(1921).—Samples of "Special Motor Fuel (F. 7)" from Birmingham, which had been obtained by cracking heavy oils and consisted largely of olefins, showed signs of incomplete decompn. and a tendency to detonate when burnt in the bomb calorimeter, yielding inconsistent results. After unsuccessful attempts to overcome this difficulty by using a sealed bulb and by employing mixts. of the fuel with benzene and xylene, results agreeing to within 1% were obtained by employing O dild. with about 20% of  $\text{CO}_2$  for the combustions.

J. S. C. I.

**Calorific values of gasoline and of gasoline fractions.** Royal Aircraft Report, No. H. 861; *J. Inst. Petroleum Tech.* 7, 342-51(1921).—Investigations were made on the calorific values of various motor fuels to find the relationship between these values and other phys. and chem. properties. The fuels tested included Shell "A" aviation spirit from Sumatra, two samples of American gasoline, and samples of gasoline from Sumatra and Borneo prep'd. to meet the requirements of the French "extra-aviation" specifications. The calorific values of benzene, toluene, and xylene, and of fractions obtained by distg. gasoline were also det'd. In calcg. the net calorific value of a fuel, i. e., the amt. of heat available in the engine, the wt. of water formed from the fuel was calc'd.

from the % of H present as estd. by the Cu oxide method. Exptl. details are given of the methods of working adopted, and the results obtained are tabulated and plotted. In the gasoline samples, the calorific values, which differed from each other by little more than 1%, increased with an increase of H content, and decreased with increased sp. gr. and with increased content of aromatic compds. In the gasoline fractions there was a fall in calorific value of about 3% in ascending the scale from pentane to octane, and the calorific values of the aromatic hydrocarbons tested showed a regular increase with decreasing sp. gr.

J. S. C. I.

**The oil fields of Burma and India.** ANON. *Petroleum Times* 7, 595(1922).—Crude oil from the Yenangyoung field has a sp. gr. of 0.800 to 0.950 and yields naphtha 15, kerosene 55-60, solid paraffin 12-14, lubricating oils 8-12, loss and coke 5%. That from the Digboi field has a sp. gr. of about 0.85 and yields benzine 10, kerosene 55, intermediate oils 15, lubricating oils 8, paraffin wax 9, coke 3%. Total annual production figures are given for India from 1908 to 1920.

D. F. BROWN

**Increased yield of methyl alcohol from wood.** U. S. Forest Products Lab., Madison, Wis., *Tech. Note No. 154*.—The addn. of a small quantity of Na carbonate to wood before distn. results in an increase of 50% in the yield of MeOH without diminishing the production of AcOH. Sawdust is satd. with a soln. of Na carbonate; pressure treatment is required with wood blocks. A sample of maple sawdust untreated yielded 1.61% of MeOH and 5.22% of AcOH; in presence of 1.5% of Na carbonate the yields were 2.39% and 5.26%, resp. Untreated white oak similarly yielded 1.17% of MeOH and 4.91% of AcOH, and 2.58% and 5.09%, resp., after impregnation with 0.5% of Na carbonate.

J. S. C. I.

**Production of acetic acid, acetone, (methanol), and furfural from raw fibrous material.** HANS PRINGSHEIM. *Cellulosechemie*, 2, 123-4(1921).—The principle of the method consists in heating the material in a stream of dry air contg. HCl vapor (1.5% concn. usually used). Straw gave 4.27% AcOH, 2.09% AcMe and 8.31% furfural, with 75% residue. Wood gave 6% AcOH, 1.68% AcMe and 3.50% furfural. Many other tests, at varying concns. and temps. were reported.

C. J. WEST

**Petroliferous rocks in Serra da Baliza (OLIVEIRA) 8.** Oil fields of Russia (THOMPSON, MADGWICK) 8. Irvine oil district (ST. CLAIR) 8. Genetic problems affecting search for new oil regions (WHITE) 8. Rise and decline in production of petroleum in Ohio and Indiana (BOWNOCKER) 8.

**Treatment of hydrocarbons.** H. PLAUSON. *Can.* 220,514, July 4, 1922. In treating hydrocarbons with reagents at high temp. and pressure the hydrocarbon is gradually supplied in small and limited amts. to the reaction space so that the hydrocarbon is continuously cracked.

**Cracking hydrocarbon oils.** D. T. DAY. U. S. 1,422,038, July 4. Oils of relatively high b. p. such as those b. 150-350° are at least partially vaporized and the vapors are immediately compressed by the action of a sliding piston which moves with such rapidity as to generate heat and pressure to effect cracking of the vapors.

**Cracking oils.** R. D. GEORGE. U. S. 1,420,832, June 27. Heavy hydrocarbon oil is heated in continuous flow through an upright still to a cracking temp. and heated oil from the top of the still is delivered to a sepg. chamber contg. a pool of hot oil at a level above the still. Vapors from the oil are condensed and oil from the pool is delivered to a C separator and thence to the lower portion of the still. Not more than 1% C is allowed to remain in the oil. Cf. C. A. 15, 1073.

**Treatment of oil shale.** H. PLAUSON. *Can.* 220,517, July 4, 1922. Hydrocarbon

is extd. from shale by emulsifying the hydrocarbon with water by a mechanical disintegration at very high speed and sepg. the emulsion from the mineral residue of the shale.

**Vertical retorts for treating oil-bearing shale.** G. A. HEIMBUCHER. U. S. 1,421,228, June 27.

**Excluding water from oil and gas wells.** R. V. MILLS. U. S. 1,421,706, July 4. Chemicals are introduced into the well which react to form an impervious ppt. in the rock forming the wall of the well, *e. g.*, Na silicate and  $\text{CaCl}_2$  or  $\text{MgCl}_2$  or HCl.

**Treating sludge acids.** I. HECHENBLEIENER and T. C. OLIVER. U. S. 1,421,688, July 4. Sludge acids from treating petroleum oil with  $\text{H}_2\text{SO}_4$  are heated while at a strength below that which would result in charring or coking the material at the temp. used and are then concd. by further heating. Cf. C. A. 16, 2405.

**Purifying apparatus for lubricating oils.** E. E. HANS. U. S. 1,420,837, June 27. The app. is adapted for use in connection with internal-combustion engines and serves to distil off vol. diluents from the oil.

## 23—CELLULOSE AND PAPER

CLARENCE J. WEST

**Cellulose. II. A new form of the hydrogen capillary viscosimeter.** M. NAKAON. *J. Chem. Ind. (Japan)* 24, 1395-8(1921); cf. C. A. 16, 2405.—A modified H capillary viscosimeter is described, specially suitable for cuprammonium solns. of cellulose, and possessing the advantages over that used by Gibson and others (cf. C. A. 14, 2417) of being simpler in manipulation and avoiding loss of  $\text{NH}_3$  from the cuprammonium soln. It consists of a stoppered glass vessel of about 30 cc. capacity provided with two branch tubes, one at the top extending vertically upwards and connected by a side tube with a supply of H, and the other at the bottom connected with a vertical capillary tube 12 cm. long, surmounted by a bulb of about 3 cc. capacity. The tube at the upper part of the bulb is provided with a side outlet for H and its upper end is connected with the upper end of the other branch tube by a piece of rubber tubing 45-60 cm. long. Air in the app. is displaced by H, the cellulose and cuprammonium soln. are introduced, and the app. is shaken to dissolve the cellulose and then immersed in a thermostat. The soln. is forced up into the capillary bulb by pressing the rubber tubing. J. S. C. I.

**The action of iodine upon cellulose, silk and wool.** J. HUEBNER and J. N. SINHA. *J. Soc. Chem. Ind.* 41, 93-4T(1922).—On steam-distg. poplar cellulose pulp with I and NaOH, pure  $\text{CHI}_3$  was readily obtained. Appreciable yields were obtained even after 20 successive treatments. Varying yields were also obtained from other celluloses, silk, some artificial silks, wool, rubber and other substances. The amt. of  $\text{CHI}_3$  appears to bear some definite relation to the soly. of the different celluloses in NaOH.  $\text{CHBr}_3$  has also been obtained. C. J. WEST

**Effect of water and of certain organic salts upon celluloses.** J. HUEBNER and F. KAYE. *J. Soc. Chem. Ind.* 41, 94T(1922).—Cotton or other celluloses, in contact with  $\text{H}_2\text{O}$  (or over distd.  $\text{H}_2\text{O}$  in a closed vessel), or in a soln. of  $\text{AcONa}$  yield sol. substances which are aldehydic in character. In the case of salts, the aldehyde may be sepd. by distn. There is also an increase in temp. and a decrease in total vol. C. J. W.

**Technical analysis of cellulose acetate.** O. TORII. *J. Chem. Ind. (Japan)* 25, 118-31.—From a comparison of the methods of Green and Perkin, Ost, Woodbridge, Bathelemy, Eberstadt, and Barnett for the technical analysis of cellulose acetate T. concludes that Eberstadt's method is the best in principle. The following procedure is recommended: 0.2-0.3 g. of the sample is moistened with a small quantity of alc.,

to which 10 cc. of *N*/ alkali soln. is added, the mixt. is left for about 1 hr., with frequent shakings, at the room temp., and the remaining alkali is then titrated with *N*/ acid.

J. S. C. I.

**Viscosity of some cellulose acetate solutions.** GUY BARR AND L. L. BIRCUMSHAW. *Trans. Faraday Soc.* 16, 72-5(1921).—The viscosity and d. of 5% solns. of cellulose acetate have been detd. in acetone and mixts. of acetone and water, benzene, and EtOH, resp. The second solvent was added in all concns. up to the point where cellulose acetate was pptd. The viscosity-concn. (of second solvent) curves are markedly different. Benzene causes a progressive increase in the viscosity with increase in the concn., whereas water and EtOH give an initial rapid fall in viscosity, which in the case of water reaches a min. and then rises fairly rapidly but with alc. remains fairly const. at the min. value.

J. C. S.

**Effect of mechanical disintegration of the cellulose on the viscosity of cellulose solutions.** P. WAENTIG. *Text. Forsch.* 3, 154-7(1921).—Both dry grinding and the wet beating process produce a large decrease in viscosity of solns. of the cellulose so treated. A similar lowering of viscosity is produced by the ripening which occurs when alkali-cellulose (from which the mercerizing liquor has been pressed out) is allowed to stand for a long period. The ripening is considered to be a chem. process. J. S. C. I.

**Oxycellulose.** EMIL HEUSER AND FRITZ STÖCKIGT. *Cellulosechemie* 3, 61-76 (1922).—The furfural yield of purified cotton cannot readily be decreased below 0.5%. Pure cellulose and hydrocellulose split off only oxymethylfurfural. Oxycellulose of a definite degree of oxidation gives only furfural but no methylfurfural. Oxymethylfurfural is present in very small amts. as an impurity. The Cu no. of oxycellulose alone does not suffice for differentiating it from hydrocellulose. Only those qual. reactions of oxycellulose are characteristic that depend upon the reactivity of the CO<sub>2</sub>H-group, such as testing with methyl orange according to Schwalbe and Becker and the naphthoresorcin reaction. The most characteristic property of oxycellulose is its capacity to yield CO<sub>2</sub> upon distn. with dil. HCl, which is a direct proof of the presence of the CO<sub>2</sub>H-group. Under the same conditions, hexoses, cellulose and hydrocellulose do not yield CO<sub>2</sub>. Through partial hydrolysis of oxidized cellulose by means of dil. acid under pressure the very small amt. of oxidized material may be sepd. The residue consists of hydrocellulose. The acid which was split off was isolated as a Ba salt, but could not be identified because of its instability. Crude oxycellulose consists of a large amt. of unchanged cellulose and a very small amt. of a complex compd. (cellulose + oxidation product). NaOH removes only this complex compd. leaving unchanged cellulose. Pure oxycellulose must, therefore, be considered as a uniform product, probably, according to Pringsheim's hypothesis, consisting of a union of polymerized anhydrocellulose with cellobionic acid, or, more correctly, with a deriv. of this, which probably is a dibasic aldehyde-carboxylic acid. The comparative yields of glucose from these various products was found to be: cellulose, 94.1%; hydrocellulose, 93; chromic acid-oxycellulose, 83.8; residue from the partial hydrolysis of the latter, 92.6. C. J. W.

**Formation of oxalic acid from lignin.** EMIL HEUSER AND ARNE WINSVOLD. *Cellulosechemie* 2, 113(1921); cf. *C. A.* 15, 2983.—Heating 4 g. lignin, prepd. according to Willstätter and Zechmeister, with 50 g. KOH at 280° for 40 min., gave 20% oxalic acid.

C. J. WEST

**Estimation of the degree of beating of paper pulp.** E. W. L. SKARR. *Papierfabr.* 19, 569-76(1921); *J. Soc. Chem. Ind.* 41, 9A.—The quality of paper depends most intimately on the condition of the beaten pulp. Three factors have to be taken into account: subdivision longitudinally, that is sepn. of the fiber bundles and production of fibrillae; subdivision transversely, that is length of fibers; colloidal hydration, that is "wetness" or "softness." By variations in the raw material and its chem. treatment,

in the nature, pressure and manipulation of the beating elements and in the time of beating, very many degrees and combinations of these 3 factors are possible. Microscopical measurements permit no safe conclusion to be drawn regarding the colloidal "softness" of the beaten pulp and identical pulps. One much softer than the other through having been stored for 14 days in the drainer chest before beating, beaten under the same conditions gives totally different types of papers. Owing to the complexity of the factors app. designed to show total or av. rates of draining of the pulp do not afford a sufficient differentiation between the different conditions of beating. S. still uses his early app. (*C. A.* 8, 1205). The diagrams obtained by plotting the vol. of  $H_2O$  against the time indicate the proportion of short to long fibers by the sharp bend in the course of the curve. Long-fibered pulp shows the quickest initial velocity of draining and the presence of short fibers causes a subsequent slowing down. Pulps with uniformly short fibers but without much hydration show much slower draining at the start than those with long fibers; they have, however, a much higher initial velocity than hydrated pulps. Hydration or "wetness" of the pulp is characterized by a slower rate of draining which tends to be more uniform throughout. The Schopper-Riegler pulp-tester divides the  $H_2O$  into quick-flowing and slow-flowing portions and this principle, if properly dimensioned, is capable of giving results in the majority of cases comparable with the S. diagram. C. J. WEBB

The dyeing of paper pulp. J. HUEBNER. *J. Soc. Dyers Colourists* 37, 139-45 (1921).—Expts. are given showing the effect of fiber length and time of immersion upon the amt. of dye absorbed by various fibers, the effect of adding rosin sizing materials and clay, and the difference in behavior of various dyes. Cotton, wool, jute, poplar, sulfite and esparto celluloses were studied with night blue, naphthol yellow S, ponceau RR, metanil yellow and scarlet R. In general, the finer the pulp and longer the immersion, the greater the absorption of dye, the finer pulps reaching the max. in much less time. China clay and rosin sizing materials accelerate the absorption, but there is a wide variation between the different fibers and dyes. 5 tables. C. E. M.

The fluorescence of cellulose and its derivatives (LEWIS) 3. Tanning materials from cellulose waste sulfite lye (*Can. pat.* 220,390) 29.

Homogenizing cellulose esters. H. S. MORK and C. F. COFFIN, JR. U. S. 1,421,288, June 27. Several batches of cellulose acetate, butyrate or propionate are mixed together with a solvent in such regulated relative proportions as to form a product of desired dyeing speed. U. S. 1,421,289 relates to a similar process in which esters of slower dyeing speed are given a preliminary treatment, e. g., to effect partial de-esterification, to increase their dyeing speed before mixing them with other batches. U. S. 1,421,290 also relates to a similar method.

Cellulose acetates. J. O. ZDANOWICH. *Can.* 220,531, July 4, 1922. Cellulose is introduced into a mixt. of  $Ac_2O$  and  $AcOH$ ;  $Cl$  is passed into the mixt. and a small quantity of  $H_2SO_4$  is added to the reaction product to produce cellulose acetate which is then treated with  $HCHO$ . The acetates formed are sol. in  $CH_3COCH_3$ ,  $CHCl_3$ , etc.

Ethers of cellulose. L. LILIENTHAL. *Can.* 220,831, July 11, 1922. Cellulose ethyl ethers are made by the reaction of  $Et_2SO_4$  on cellulose derivs. prepd. by reaction on cellulose with  $NaOH$ . These are solids readily sol. in cold  $H_2O$ ,  $HCOOH$ , hot or cold dil.  $HOAc$ , but insol. in alc. and in hot  $H_2O$ , unless a relatively large amt. of  $Et_2SO_4$  is used, then the product is sol. in alc. Various examples of methods of making the ethers are given.

Paper pulp from peat. A. L. BURLIN. U. S. 1,420,303, June 20. Freshly dug peat is boiled in a dil. aq. soln. of soda, drained and successively treated with bleaching



powder, aq.  $\text{NaHCO}_3$  soln., dil. acid, cold  $\text{H}_2\text{O}$ , a dil. aq. soln. of 2% its wt. of bleaching powder and is then washed with  $\text{H}_2\text{O}$  and filter-pressed. Cf. C. A. 16, 342.

**Treatment of Japanese paper.** MASAYOSHI ISHII. Jap. 39,541, Aug. 16, 1921. A strong and waterproof paper is manufd. by treating thin Japanese paper with a soln. of 375 g. *Chondrus ocellatus*, 18.8 g. flowers of Zn, 75 g. wood pulp in 9 l.  $\text{H}_2\text{O}$ , and then rolling through hot rollers.

**De-inking paper.** H. R. EYRICH and J. A. SCHREIBER. U. S. 1,421,195, June 27. An alk. soln. prepd. from bentonite 300 and  $\text{Na}_2\text{CO}_3$  200 parts is used for removing ink from printed paper.

**Grease-proofing paper.** W. L. WRIGHT. U. S. 1,420,173, June 20. Paper is treated with a compn. contg. casein, glycerol and sugar. Cf. C. A. 16, 2780.

**Apparatus for disintegrating and de-inking paper-stock.** M. C. J. BILLINGHAM. U. S. 1,420,362, June 20. The printed stock is injected upwardly through a vertical nozzle against a perforated baffle which effects disintegration.

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

**Gelatinization of nitrocellulose.** MARQUETROL and FLORENTIN. *Mem. poudres* 18, 150-167(1921).—In addition to *dimethyldiphenylurea* (Centralite) and *camphor*, the first substances used to retard surface combustion of *smokeless powder* grains in the manuf. of "progressive" powder, a list is given of many esters, amines, Cl derivs., ketones and alcs., the use of which for similar purposes has been patented. Properties and methods of prepn. of *phenyl carbonate*, *dimethylphenyl-o-tolylurea*, *dimethyldi-o-tolylurea*, and *ethyl sebacate* are described. Comparative tests of the colloiding effect of various substances in EtOH soln. on sol. nitrocellulose ( $\text{CP}_2$ ) at 35° were made, by detg. the proportion by wt. of active ingredient required to give complete gelatinization of the  $\text{CP}_2$  on evapn. of the EtOH. 100 parts  $\text{CP}_2$  required 70 parts of ethyl sebacate, 75 parts of dimethylphenyl-o-tolylurea, 80 parts dimethylditolylurea, 85 parts camphor, and 85 parts diethyldiphenylurea. *Dimethyldiphenylurea*, *cyclohexanone*, *turpentine hydrochloride*, *phenyl acetate*, *phenyl carbonate*, and *borneol* failed to give homogeneous colloids under the conditions of the test. Trials with insol. nitrocellulose ( $\text{CP}_1$ ) showed it required a much larger porportion of gelatinizing agent, e. g., 330% of ethyl sebacate. In another series of tests the gelatinizing powers of the following were detd. in similar manner: *ethyl succinate*, *ethyl phthalate*, *ethyl citrate*, *benzyl benzoate*, *ethyl malonate*, *triphenyl phosphate*, *ethyl oxalate*, *ethyl stearate*, *acetophenone*, *benzylacetate*, *ethyl acetoacetate*, and *ethyl ricinoleate*. The first two gave good gelatinization with 90 and 95 parts to 100 parts  $\text{CP}_1$ ; with all of the others gelatinization was incomplete. The most efficient of all of the gelatinizing agents tested (at 35-40°) are ethyl sebacate and dimethylphenyltolylurea. Both are readily prepd., only slightly volatile at ordinary temps. and sol. in all proportions in both EtOH and  $\text{Et}_2\text{O}$ , so that only a small proportion of such solvent is required in colloiding nitrocellulose. If no solvent is used the gelatinization requires a temp. near the m. p. of the gelatinizing agent. C. G. STORM

**The gelatinization of nitrocellulose.** J. DESMAROUX. *Mem. poudres* 18, 169-82 (1921).—The readiness with which a sample of nitrocellulose is gelatinized by a solvent is an important factor in the use of the nitrocellulose in the manuf. of *smokeless powder*. Of mixts. of  $\text{Et}_2\text{O}$  and EtOH, the 2 : 1 mixt. (by vol.) is the best gelatinizing agent. Substituting alcs. of higher mol. wt. than EtOH gives decreased soly. Special study was made of the effect of the 2 : 1  $\text{Et}_2\text{O}$ -AmOH mixt. on samples of nitrocellulose (grade  $\text{CP}_2$ ). With anhyd. materials, the addition of 1%  $\text{H}_2\text{O}$  increases soly. to a marked

degree—on one sample from 16.5% to 100%, on another from 2.2% to 10.8%. The  $H_2O$  content of the solvent is, therefore, of great importance. The effect of temp. also is very great; 2 samples 16.5% and 38.8% sol. at  $20^\circ$  were, resp., 82.5% and 100% sol. at  $12^\circ$ . The gelatinization test developed and used during the War at the powder factories at the Pont-de-Buis and Moulin-Blanc was as follows: 1.5 g. of the nitrocellulose to be tested is placed in a heavy test tube and 25 cc. of the  $AmOH-Et_2O-H_2O$  mixt. added, the tube being stoppered and kept at  $20^\circ$  in a water bath, with frequent shaking, for 48 hrs. After centrifuging, 10 cc. of clear liquid is decanted, evapd., and the residue weighed. The % of original sample dissolved is designated as the *coefficient of gelatinization*. The proportion of  $H_2O$  used in the solvent is detd. by trial to suit the type of nitrocellulose in question, so as to magnify differences in gelatinizing ability of various samples. It is apparent that with increased coeff. of gelatinization, great economy of solvent results in manuf. of colloided smokeless powder. C. G. STORM

**Modification of the method of measuring the coefficient of gelatinization (of nitrocellulose).** ABDERHALDEN. *Mem. poudres* 18, 183-4(1921).—The method of detg. the coeff. of gelatinization described by Desmaroux (preceding abstr.) presents a difficulty in sepg. the sol. from the undissolved part of the sample, in the case of certain samples, owing to the high viscosity of the soln. The modified method overcomes this and eliminates the necessity of centrifuging. Only 0.5 g. of the dry sample is treated with 25 cc. of the  $Et_2O-AmOH$  mixt. prepd. according to exact directions, the stoppered tube kept in a thermostat for 48 hrs. as already described, and 5 cc. of the perfectly clear sol. taken for evapn. With these proportions the no. of mg. of residue equal the coeff. of gelatinization. Results with this method are much higher but more concordant than when 1.5 g. sample is used. C. G. STORM

**Ignition of nitrocellulose and Poudre B in vacuo and in air.** KOEHLER and MARQUEYROL. *Mem. poudres* 18, 138-49(1921).—Samples of 0.01-0.03 g. of nitrocellulose and 0.05-0.10 g. of *smokeless powder* (Poudre B) were placed in test tubes (1) open to the air, (2) under reduced pressure maintained at about 14 mm. Hg, or (3) filled with  $CO_2$ . The tubes were immersed in an oil bath at temps. from  $150^\circ$  to  $175^\circ$  and the temp. was increased at varying rates until the sample ignited. The *ignition temp.* was practically the same in air, *in vacuo*, and in  $CO_2$ , varying in 44 samples of nitrocellulose from  $180^\circ$  to  $190^\circ$ , and in 29 samples of powder from  $174^\circ$  to  $180^\circ$ . It is apparent that O of the air plays no direct part in the ignition proper. The lower ignition temp. of the powder is due to its greater density. Storage of Poudre B in a vacuum would appear to be without advantage. C. G. STORM

**Trimethyleneglycol dinitrate.** F. BLECHTA. *Z. ges. Schiess-Sprengstoffw.* 17, 57-8(1922).—In the manuf. of *nitroglycerin* during the war from fermentation glycerol, yields were poor, the rise in temp. during nitration was excessive and explosions were not infrequent. Fractional distn. of the crude glycerol gave 35% of liquid  $b_{120-125^\circ}$  and d. 1.057; this which was assumed to be *trimethyleneglycol*. Ten g. of pure  $(CH_2)_3(OH)_2$  was nitrated at  $8^\circ$  with 200 g. mixed acid (66.55%  $H_2SO_4$ , 25.26%  $HNO_3$ , 8.19%  $H_2O$ ). The reaction was much more violent than with glycerol, drops of the trimethyleneglycol on the end of the dropping funnel igniting when splashed with acid. The washed and dried product contained 18.71% N (theory 18.87%), was less viscous than nitroglycerin,  $d_{15}$  1.408, sol. in  $MeOH$ ,  $Et_2O$ ,  $CHCl_3$ ,  $C_6H_6$  and  $Me_2CO$ , slightly sol. in  $CS_2$ , sol. (1 : 5) in  $EtOH$ , and (1 : 410) in  $H_2O$ . It failed to solidify in 3 hrs. at  $-20^\circ$ . It gave a heat test (KI-starch paper) at  $83^\circ$  of 45 min. and showed the same sensitiveness to impact as nitroglycerin (drop test of 4 cm. with 2-kg. weight). C. G. STORM

**Abnormal crystallization of lead azide by protective colloids.** A. G. LOWNDES. *Trans. Faraday Soc.* 16, Appendix, 128-9(1921).—Pb azide when formed in large crystals is liable to explode and is therefore not entirely suitable for detonators. It is gen-

erally held that the explosions are caused by the fracture of large crystals. It is shown in prep. Pb azide that, if instead of running Na azide and Pb acetate solns. into water the solns. are run into a 0.5% soln. of gelatin or dextrin, small crystals which are not liable to fracture are produced. The presence of  $\text{FeCl}_3$  also causes the formation of small crystals, but these are useless for the filling of detonators. A number of photomicrographs of Pb azide prepd. by the various methods are included in the paper.

J. C. S.

Action of Hertzian waves on powder and explosives. BRIOTET. *Mem. poudres* 18, 208-226(1921).—Hertzian waves and powerful electrostatic fields are without influence on the stability of powders. On the other hand energetic oscillating fields are capable of inducing high e. m. f.'s in masses of metal not in electrical contact with the source producing these fields. These e. m. f.'s can give rise to sparks capable of firing explosives. These conditions arise in the case of oscillating discharges of atm. electricity during thunderstorms, but would only be dangerous in the case of exposed explosives not enclosed by metallic conductors. The remedy is to "earth" thoroughly all metallic objects in the neighborhood of exposed explosives.

J. S. C. I.

Employment of the quartz mercury vapor lamp in the study of the stability of Poudre B. BRIOTET. *Mem. poudres* 18, 185-207(1921).—The direct employment of the quartz Hg vapor lamp is not justifiable since its action is distinct from that of the agents which come into play in the ordinary storage of powders. Its employment when standardized against the heat test is rendered impossible by practical difficulties due to lack of uniformity of the field of radiation, the rapid absorption by air of radiation of very short wave length, which is the most active chemically, and the rapid variation of the quality of the radiation with slight differences in the voltage and amperage used. These difficulties make the Hg vapor lamp useless as an instrument of precision and not likely in the present state of knowledge to give useful results in the study of the stability of powders.

J. S. C. I.

The explosions at Zschornowitz and Bodio. F. RASCHIG. *Z. angew. Chem.* 35, 117-9(1922).—Three explosions at Zschornowitz (Z.) occurred June 18, 1917; that at Bodio (B.) on July 21, 1921. These and a third plant were erected for  $\text{HNO}_3$  production by elec. arc in air contg. 50% O, the  $\text{NO}_2$  being sepd. out by freezing and later converted into  $\text{HNO}_3$ . At Z. the cooling medium was  $\text{C}_2\text{H}_6$ . At B. benzine was used. In each case these liquids were brought to  $-70$  by  $\text{C}_2\text{H}_6$  compressors. The explosion in each case followed the accidental admixing of the  $\text{C}_2\text{H}_6$  or the benzine with  $\text{NO}_2$ . At Z. the escape of the  $\text{NO}_2$  was attributed to the corrosion of the cooling tubes. There was at Z. 6000 kg. of liquid  $\text{C}_2\text{H}_6$  on storage at the point where the heaviest explosion occurred. The opinion was expressed that TNT was formed and subsequently exploded. The Bodio accident was described by Fierz (*C. A.* 16, 1868). The method of recovering  $\text{NO}_2$  by cooling has been abandoned after many years' trial. The details of manuf. are quite fully given.

CHARLES E. MUNROE

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Mercury fulminate as a skin irritant (LIVINGSTON) 11H.

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Explosive. L. O. BRYAN. U. S. 1,420,364, June 20. An explosive adapted for use in blasting is formed of nitrocellulose 40-65, powdered Al 0.3-5% and nitroglycerin or a similar liquid explosive 1-10, together with  $\text{CaCO}_3$  1 and  $\text{NaNO}_3$  30-50 parts. Ground smokeless powder may be used as an ingredient.

Explosive tablet for railway signal torpedoes. F. DUTCHER. U. S. 1,421,187, June 27. A dry tablet for signal torpedoes is formed of a main charge of  $\text{KNO}_3$  60, S 30 and C 10% and a smaller igniting charge of  $\text{KClO}_3$ , S and shellac. U. S. 1,421,188

relates to structural features of signal torpedoes provided with a device for fastening them to a rail.

**Filling shells or receptacles with trinitrotoluene.** J. P. MADDEN and L. FISHER. U. S. 1,420,637, June 27. A portion of the TNT is melted and then mixed with about 2.5 times as much solid TNT to form a plastic mixt. for filling.

## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

**Colors and dyes from *p*-phenetidine.** J. G. SCHMIDT. *Color Trade J.* 9, 243-4 (1921).—A short description of the lakes and colors formed by coupling diazotized *p*-phenetidine with  $\beta$ -naphthol and R-salt; and by sulfonating, diazotizing and coupling.

CHAS. E. MULLIN

**Dyestuffs of the pyrazolone series.** MARY JOHNSON. *J. Soc. Chem. Ind.* 40, 176-8T (1921).—J. prepd. a no. of true tartrazines by condensing a no. of  $N_2H_4$  derivs. of benzene and naphthalenesulfonic acids with Na dihydroxytartarate (A). (A) is prepd. according to Green (*Organic Coloring Matters* 1908, p. 71), a freezing mixt. being used instead of ice water in the hydrolysis of the nitrotartaric acid. The first dye described (C) was formed by condensing A with  $p\text{-H}_2\text{NNHC}_6\text{H}_4\text{SO}_3\text{H}\cdot 0.5\text{H}_2\text{O}$  (B). B is prepd. according to Fischer (*Ann.* 190, 76 (1877)), in good yield. 2 mols. (60 g.) of pure B and 1.05 mols. (42 g.) of A are rubbed together in a mortar with a little  $\text{H}_2\text{O}$ , transferred to a suitable sized flask with about 100-150 cc.  $\text{H}_2\text{O}$ , and warmed on the water bath; the color changes to a deep orange in a few min., the soln. is made complete by boiling and 159 cc. 0.1 *N*  $\text{Na}_2\text{CO}_3$  soln. is added. The  $\text{Na}_2\text{CO}_3$  supplies the necessary Na to form the tri-Na salt. The soln. is quickly filtered into 1.2 l. of warm rectified spirit. The flask is washed out with a little boiling  $\text{H}_2\text{O}$ . A dense yellow ppt. of the C forms and is allowed to stand several hrs. The dye is filtered at the pump. The direct yield is 60% of the theory. The balance may be recovered from the mother liquor. Analysis showed the dye to be  $\text{C}_{16}\text{H}_9\text{O}_3\text{N}_4\text{S}_2\text{Na}_3\cdot 13\text{H}_2\text{O}$ . In each case the other tartrazines were condensed in the same manner and on purification proved very pure.  $\text{H}_2\text{NNH}\cdot\text{C}_6\text{H}_4\text{SO}_3\text{H}\cdot 2\text{H}_2\text{O}$  was prepd. by Limpicht's method (*Ber.* 21, 3409 (1888)), the yield being 42%. From this was made a tartrazine, D, also a tri-Na salt contg. 6 mols.  $\text{H}_2\text{O}$  which was somewhat lighter in color and isomeric with ordinary tartrazine. Two other tartrazines from 1, 4- and 1,5- $\text{C}_{10}\text{H}_6(\text{NHNH}_2)\text{SO}_3\text{H}$  were made. The 1,4-acid was made according to Erdmann (*Ann.* 247, 333 (1884)), and purified by dissolving in boiling  $\text{Na}_2\text{CO}_3$ , filtering and acidifying with HCl. The dye E yield was but 32% and contained 6 mols. of  $\text{H}_2\text{O}$ . It was a tri-Na salt. The 1,5-acid was made from 1,5- $\text{C}_{10}\text{H}_6(\text{NO}_2)\text{SO}_3\text{H}$  by reduction with Fe and AcOH and the  $\text{NH}_2$  acid was converted into the desired acid by diazotization and  $\text{SnCl}_2$  reduction (directions given); yield 90%. The Na salt of this acid contains 4.5 mols.  $\text{H}_2\text{O}$ . The yield of dye (F) from the 1,5-acid was poor. It contained 14 mols. of  $\text{H}_2\text{O}$  of crystn. and was a tri-Na salt. Dye C or ordinary tartrazine and dye D were similar in color while E and F were red. C dyed wool orange-yellow, D gave a yellower shade, E gave a bright red while F was somewhat browner. Absorption spectra show that dye C is the most suitable for use for photographic screen work.

R. E. SABIN

**Method for making methyl violet.** H. J. M. CREIGHTON. *Proc. Trans. Nova Scotian Inst. Sci.* 15, 57-61 (1918-9).—The following method has been developed and found to give good results in the manuf. of Me violet of a 2B shade. Finely ground  $\text{CuSO}_4$  equal to 12 kg. of the hydrated salt, is intimately mixed with 190 kg. dried NaCl. To this mixt., with const. stirring, are added, first 8 kg. PhOH dissolved in 1 l.  $\text{H}_2\text{O}$ ,

then gradually 20 kg.  $C_6H_5(CH_3)_2$ . The mass is transferred to a closed iron vessel, kept at a temp. of  $57^\circ$  to  $60^\circ$ , and stirred continuously until a sample, squeezed in the hand, forms a ball which does not fall apart; approx. 8 hrs. are required. Considerable heat is generated by the reaction; the amt. of this heat depends on the degree of hydration of the  $CuSO_4$  used. The mass is gradually transferred to a wooden vat containing a boiling solution of 13 kg. slaked lime in 1000 l.  $H_2O$ . High-pressure steam is blown into the liquid until all lumps have disappeared. After the insol. double salt of the color base with  $CuCl$  has deposited, the supernatant liquid is run off. The double salt is suspended in 1000 l.  $H_2O$  in the same vat; the temp. is brought to  $70^\circ$ , and 3.3 kg.  $Na_2S$  dissolved in a small amt.  $H_2O$  are slowly added while stirring continuously. At the end of 30 min., heat is applied, and the liquid is boiled for 5 or 6 hrs. The color base and the  $Cu_2S$  are permitted to settle; the supernatant liquid is run off; and the residue is washed with 2 successive portions of water of 1000 l. each. Then 1000 l.  $H_2O$  are run into the vat and heated to boiling; 15 kg.  $H_2SO_4$  are gradually added; and boiling is continued for 2 hrs. A deep violet soln. of the dye is obtained, while practically all the  $Cu_2S$  remains undissolved. The insol. matter is permitted to settle, and the soln. is run into a second vat. Extn. of the insol. matter with dil.  $H_2SO_4$  is repeated and the resulting soln. is added to the contents of the second vat, which are then almost neutralized with  $NaOH$ .  $NaCl$  is added to salt out the dye, which separates as a lustrous green resinous mass as cooling occurs. The dye is dissolved in 750 l. boiling  $H_2O$ ; the soln. is filtered into a third vat in which a particularly pure Me violet is obtained by salting out. The insol. residue in the second vat and on the filter is returned to the first vat for treatment with the next lot. JOSEPH S. HEPBURN

**Fastness properties of the principal red dyes.** BARRINGTON DE PUYSTER. *Color Trade J.* 8, 106-14(1921).—A general discussion of the fastness of red dyes is followed by a table giving the name, Schultz number, dye class, fibers to which it is applied, method of dyeing, and fastness to light, washing and acid, for 385 red dyes.

C. E. M.

**Identification and properties of direct cotton yellow.** LOUIS G. HAYES. *Color Trade J.* 7, 86-91(1920).—A complete description of the various direct yellows: methods of dyeing; dyeing properties; fastness; reactions with  $H_2SO_4$ ,  $HCl$  and  $NaOH$ ; present and pre-war names, and Schultz and Julius number. Three tables are given.

C. E. M.

**Identification and properties of direct cotton orange and brown dyes.** LOUIS G. HAYES. *Color Trade J.* 8, 142-4(1921).—A complete description of the various direct orange and brown dyes.

CHAS. E. MULLIN

**Identification and properties of direct cotton blue dyes. III.** LOUIS G. HAYES. *Color Trade J.* 8, 185-8(1921).—A complete description of the various direct blues.

CHAS. E. MULLIN

**The manufacture of 3-amino-*p*-phenolsulfonic acid.** J. R. MINEVITCH. *Color Trade J.* 9, 240-2(1921).— $C_6H_5Cl$  is sulfonated with 97%  $H_2SO_4$ . The  $C_6H_4Cl$ -*p*- $ClSO_3H$  is nitrated with 68%  $HNO_3$  and the  $C_6H_4Cl$ -*o*- $NO_2$ -*p*- $SO_3H$  is filtered off. Its acidity is neutralized with  $NaOH$  and sufficient 33%  $NaOH$  soln. is added to hydrolyze it to  $C_6H_4OH$ -*o*- $NO_2$ -*p*- $SO_3H$ . 15%  $Na_2S$  soln. is added to reduce it; 50%  $H_2SO_4$  is added to decompose the sulfide and the  $SO_2$  is boiled off. It is filtered,  $Na_2CO_3$  added to slight alkyl. and the  $C_6H_5OHNH_2SO_3H$  is ready for use.

CHAS. E. MULLIN

**The manufacture of malachite green.** J. R. MINEVITCH. *Color Trade J.* 9, 114-8(1921).—A description of the Fischer process of mfg. malachite green crystals. The condensation of  $C_6H_5N(CH_3)_2$ ,  $C_6H_5CHO$  and  $HCl$ ; and steaming of the tetramethyldiaminotriphenylmethane are treated in detail. *Ibid* 154-7.—Details are

given of the oxidation of the leuco-base with  $\text{PbO}_2$ ,  $\text{HCl}$  and  $\text{AcOH}$ ; and sulfation of the tetramethyldiaminotriphenylcarbinol. *Ibid* 181-4.—Conversion of the carbinol base into malachite green oxalate and its crystn. are discussed. Yields are given.

CHAS. E. MULLIN

**Properties and applications of fustic.** I. J. F. SPRINGER. *Color Trade J.* 9, 202-6(1921).—Properties and prepn. of fustic and its constituents. Its use in dyeing cotton and silk. II. *Ibid* 250-1.—Use in wool, cotton and silk dyeing. Formulas are given.

CHAS. E. MULLIN

**Properties and application of the rhodamines.** JOHN MACGREGOR. *Color Trade J.* 8, 229-33(1921).—The methods of applying these dyes to cotton, wool, silk and other fibers, with formulas.

CHAS. E. MULLIN

**Hyposulfites, and their technical applications.** N. CHAPPELL. *J. Soc. Dyers & Colour.* 37, 206-10(1921).—General data upon the constitution, prepn. and properties of hyposulfites are followed by a brief consideration of each variety and its uses in various processes. Hydrosulfite B. A. S.F., Hydrosulfite concd. powder (Meister, Lucius & Brüning), and Sodium Hydrosulfite (Brotherton), are anhydrous Na hyposulfite, and are widely used in vat dyeing. The simple Na hyposulfites, Hydros. Rubol (Bro.), Burmol, etc., which exert their reducing action best in alk. or neutral soln., are used for cotton stripping. Rubol is recommended for laundry use. Hydrosulfite Z (M. L. & B.) is the double Zn salt. It is less sol. but more stable than the Na salt and is used for discharging. Hydrosulfite NF (M. L. & B.), Rongalite C (Badische) and Hyraldite A (Cassella) are  $\text{Na}_2\text{S}_2\text{O}_4 \cdot 2\text{CH}_2\text{O} \cdot 4\text{H}_2\text{O}$ . This is a stable compd. which is decompd. by boiling  $\text{H}_2\text{O}$  or steam and is used for discharge work and indigo printing. It is formed by the reduction of Na bisulfite-formaldehyde with Zn dust. When a double quantity of Zn is used, Na sulfoxylate formaldehyde is formed. This is marketed as Hydrosulfite NF concd. (M. L. & B.), Rongalite C (B.), Hyraldite C (C.), and Forkosol (Bro.). It is stable and is used for stripping and for discharging the insol. azo colors. Hyraldite Z, Decroline, Hydrosulfite AZ, Stripper AZ and Zinc Formosol (Bro.) are the corresponding Zn compds., the last named being mono-zinc formaldehyde sulfoxylate,  $\text{Zn}(\text{HSO}_2\text{HCOH})_2$ . It is slightly sol. in  $\text{H}_2\text{O}$ , sol. in  $\text{AcOH}$ ,  $\text{H}_2\text{SO}_4$  or formic acid, and is only used for stripping. Hydrosulfite NF concd. special (M. L. & B.), Rongalite C special (B.), and Hyraldite A special (C) are mixtures of the sulfoxylate compds. with Induline Scarlet or Patent Blue as catalysts, and are used in discharging some especially difficult insol. azo colors. Leukotrope O and W (B.) contain benzyl chloride or its substitution products. The O brand is used in obtaining a yellow discharge on indigo. The W brand has a sulfonic acid group in the nucleus of the benzyl chloride and is used in obtaining a white discharge on indigo. Leukotrope W, mixed with  $\text{ZnO}$  and sulfoxylate formaldehyde compd., is marketed as Rongalite CL, Hydrosulfite CL and Hyraldite CL. Hyposulfites have also been used to bleach sugar juices, soaps and fats, wood pulp, straw, coconut fiber, horse hair and tannin ext.; and also as an O absorbent.

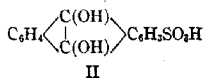
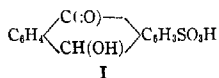
CHAS. E. MULLIN

**Antimony tannate from the colloidal point of view.** CHARLES SUNDER. *Bull. soc. ind. Mulhouse* 87, 236-9(1922).—S. points out that losses in many chem. processes are due to formation of colloidal solns. with wash  $\text{H}_2\text{O}$ . These losses may be obviated in many cases by washing with saline solns. instead of pure  $\text{H}_2\text{O}$ . Sb tannate readily forms colloidal solns. Sb tannate when pptd. on cloth is made by treating first with a soln. contg. 5% of tannin and second with a 0.7% soln. of tartar emetic. It is advisable to exceed this latter amt. to insure complete fixation. Once pptd. Sb tannate is fairly well fixed although on continued washing it will be removed. When excess of tannin is to be removed by neutralization with  $\text{NaOH}$  after printing, the whites of printed goods can be cleared by soaping off followed by chlorination, but when dyeing

to a given shade this is not practicable. In order to remove the excess of NaOH without partially dissolving the Sb tannate, S. used a hot soln. of tartar emetic contg. 20 g. per l., although part of this can be replaced by NaCl, AcOH or alum. When this method is used the neutralizing bath can be made up just equiv. to the amt. necessary and the goods can be dyed without removal from the cooled bath by direct addn. of the color. He gives the following as a typical dye bath: H<sub>2</sub>O 1300 l., glue 6.5 g., Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>.18H<sub>2</sub>O 13 kg., Victoria Blue R. Conc. Badische 80 g., crystal Violet 5 BO 60 g. He claims that one does not have to consider the question of the tannate of Sb and the dye is applied in the form of a triple lake; also the absence of protective salts makes the goods easy to dry after they have been well washed. He recommends the use of a Weckerlin machine as this gives fine clear-cut lines. With it in some cases he has been able to remove the scraped marks due to scorched starch.

R. E. SABIN

**Anthraquinone as a catalyzer in the discharge of  $\alpha$ -naphthylamine garnet.** M. BATTEGAY, A. LIPP AND H. WAGNER. *Bull. soc. ind. Mulhouse* 87, 233-5(1922).—The passivity of anthraquinone as a catalyst in the discharge of  $\alpha$ -naphthylamine garnet by the formaldehyde base of sulfoxylate of soda is a matter of fineness of subdivision. This may be remedied first by dissolving the anthraquinone in 96% H<sub>2</sub>SO<sub>4</sub> and pptg. by adding H<sub>2</sub>O, a fine white ppt. being formed; second, by dissolving in caustic alkali, a red soln. being formed, and pptg. out with a current of air; third, by incorporating the anthraquinone as usual and adding a small amt. of NaOH. The results are satisfactory. Expts. were made to find the value of the sol. Sulfonic acids of anthraquinone with negative results. On addn. of small amts. of caustic positive results were obtained in accordance with the theory that in neutral soln. there are formed the inactive keto desmotrope (I), and in an alkaline-medium the enolic form (II), which is an active O carrier.



In a subsequent investigation the possibility of the forming of inactive anthracene-sulfonic acids by reduction with the formaldehyde sulfoxylate base will be investigated.

R. E. SABIN

**Color and chemical constitution. XIII. Calculation of the color of monocyclic dyes.** JAMES MOIR. *Trans. Roy. Soc. S. Africa* 10, 35-9(1921); cf. *C. A.* 16, 2325.—Dyes which contain only one active color ring do not fit into the scheme previously described (*C. A.* 15, 1713) for those contg. two such rings, but their colors are deducible by a similar factorial scheme, based on *p*-hydroxybenzyl alc. (for which, and probably also for *p*-cresol, in faintly alk. aq. soln.,  $\lambda = 290$ ). The factors in parenthesis are employed in conjunction with this value: replacement of carbinol H by phenyl (1.135); conversion of phenylcarbinol into a phthalein (1.060); replacement of ring hydroxyl- by amino-group (1.140); replacement of amino-H atoms by Me (1.035). Values are thus predicted for certain compds. for which measurements are at present lacking. It appears that color cannot be traced to lower terms than the presence of one benzene ring, with one ionizable group, usually with another active atom, and that the phys. cause of color is the periodic motion of an electron round a mol. Although the sinuous orbit previously conceived (*C. A.* 16, 2325) is now considered not to be very likely, the tautomeric pauses then assumed are a probable feature of the orbit. It is suggested that the colors of dyes contg. two active color rings (*loc. cit.*) may be based on 4, 4'-dihydroxybenzohydrol ( $\lambda = 539$ ). The pink colors attributed to phenylphenolphthalein and to its analog from salicylic acid (*C. A.* 11, 3274; 13, 3173) were due to impurity.

J. C. S.

**Printing yellow effects on fabrics by means of perthiocyanogen.** H. SCHMID. Sealed Note 928, *Bull. soc. ind. Mulhouse* 87, 67-8(1921). Report by A. LIPP. *Ibid* 68.—Fabric is padded with a soln. of gum tragacanth which contains 150-200 g. each of  $\text{NH}_4\text{CNS}$  and  $\text{NaClO}_2$  per l., and is then steamed (as for aniline black), washed, soaped, and dried. Lemon-yellow to orange-yellow shades (due to formation of perthiocyanogen) are obtained which act as mordants for basic dyestuffs. If V salts be added to the padding liquor, the possible tendering of the fabric is avoided. Lipp states that the shades obtained are bright and fast.

J. S. C. I.

**Formic acid thickening [in printing].** C. SUNDER. *Bull. soc. ind. Mulhouse* 87, 195-6(1921).—A discharge paste prepd. from starch in presence of formic acid and then neutralized is recommended and is particularly successful on Para Red. A mixt. of 100-120 g. of starch, 7-10 g. of 90% formic acid, and 400 cc. of water is boiled for 20 mins., cooled to  $50^\circ$ , neutralized, and a concd. soln. of 50 g. of Rongalite C is added; the whole is then made up to 1 kg. To produce as effective a mixt., a greater quantity of AcOH would be required, and consequently the paste would contain a large quantity of useless NaOAc, whereas the small quantity of  $\text{HCO}_2\text{Na}$  contained in the above mixt. does not diminish the power of the discharge.

J. S. C. I.

**White [chlorate-prussiate] discharge on blue cotton fabrics.** C. SUNDER. Report on Sealed Note 1039, by V. KALLAB. *Bull. soc. ind. Mulhouse* 87, 135-6(1921).—The chlorate-prussiate discharge of the blue "ground" produced by printing or padding cotton fabric with a soln. contg.  $\text{NH}_3$ , the blue dyestuff, and sulfuricinoleic acid, and then drying and steaming, is not satisfactory. A faster blue "ground" is obtained (Bleu d'Alsace) if the padding soln. contains per kg., 50 g. of Alkali Blue, 500 g. of water, 25 g. of tin oxychloride ( $50^\circ$  Bé., sp. gr. 1.53), 60 g. of 25%  $\text{NH}_3$  soln. and 250 g. of 80%  $\text{NH}_4$  ricinoleate. The tin oxychloride is made by gradually adding 100 pts. of  $\text{SnCl}_2$  to 60 pts. of  $\text{HNO}_3$  of  $32^\circ$  Bé. (sp. gr. 1.28). A blue "ground" less bright but of superior fastness is obtained by printing a reserve on the fabric and then dyeing it by a continuous process with Indanthrene Blue.

J. S. C. I.

**Production of white and colored discharges on fabrics dyed with diamine dyestuffs by means of sodium hyposulfite and barium tungstate.** SCHEURER, LAUTH ET CIE and G. VAN CAULAERT. Sealed note 1447, 23.1.04. *Bull. soc. ind. Mulhouse* 87, 69-70(1921).—Report by A. LIPP. *Ibid* 70.—Fabric dyed with diamine dyestuffs is printed with a discharge paste contg. 250 pts. of Na tungstate, 90 pts. of hyposulfite NF. (M. L. B.), and 660 pts. of a soln. of gum tragacanth (for colored discharges lake dyes, e. g., ultramarine blue, ultramarine violet, vermilion, Guignet's green, chrome yellow, acetylene black, etc., are added). It is then steamed for 3 mins., in a Mather-Platt, passed during  $1\frac{1}{2}$  min., through a cold bath contg. 50 g. of  $\text{BaCl}_2$  per l., and is then washed and dried. The process is particularly suitable for mercerized cotton and silk. Lipp reports that fabrics dyed by this method have a more agreeable "handle" than is the case when hyposulfite and  $\text{ZnO}$ , lithopone, or  $\text{BaSO}_4$  are used in conjunction with albumin and casein.

J. S. C. I.

**Method for dyeing Manganese Bronze.** Report by C. SUNDER on Sealed Note 849, 9.1.96, of F. V. KALLAB. *Bull. soc. ind. Mulhouse* 87, 431-6(1921). Further note by L. BLOCH. *Ibid* 436-7.—Sunder reports that Kallab's method for dyeing Manganese Bronze, in which a fabric impregnated with a reducing agent (preferably Sb tannate) is treated with a soln. contg.  $\text{KMnO}_4$ , is of but little importance. The irregular reducing action of the tannic acid does not allow the production of uniform shades, and, moreover, in the production of colored effects by means of tin salts and basic dyestuffs, it is necessary to fix the latter with tannic acid, so that the apparent saving of this mordant cannot be effected in practice. A more reliable process for dyeing Manganese Bronze is that of Blanche in which the fabric is padded with a mixt. contg. Mn acetate



and a dichromate and is then steamed. It is also difficult to obtain uniform shades by means of Dépiere's method in which Mn chloride is used as a reducing agent. In a successful process described by Bloch, the fabric is padded with a soln. at 50° contg. 150 g. of Mn chloride per l., dried in a hot flue, twice passed through cold NaOH of 20° Bé. (sp. gr. 1.16), allowed to hang for several hours, washed, dried, passed through a soln. at 95° contg. 40 kg. of  $K_2CrO_7$  per 100 l., and then washed and dried.

J. S. C. I.

**Grinding and mixing apparatus in dyestuff manufacture.** IV. CHEMICUS. *Color Trade J.* 9, 103-5(1921); cf. *C. A.* 15, 2551.—Magnetic separators, Kek mills and "Coles" grinders are described. V. *Ibid* 177-80.—A description of the K-B pulverizer with remarks on grinding and pulverizing.

CHAS. E. MULLIN

**Drying machinery used in dyestuff manufacture.** I. J. F. SPRINGER. *Color Trade J.* 8, 43-7(1921).—A discussion is given of the importance of proper drying, methods of temp. control, the Gordon, Sturtevant, hot-blast and hot suction dryers. II. *Ibid* 132-5.—Construction details and a comparison of different types of heaters are given. III. *Ibid* 9, 17-9(1921).—Operating costs are discussed. C. E. M.

**Mistakes in apparatus dyeing of worsted yarns.** E. KUHN. *Textilber.* 3, 267-8 (1922).

W. F. FARAGHER

**Water in relation to dyeing.** JOHN MACGREGOR. *Color Trade J.* 9, 43-8(1921).—A discussion of the difficulties which may occur when impure  $H_2O$  is used with the various classes of dyestuffs.

CHAS. E. MULLIN

**To distinguish between bottom-chrome and top-chrome dyeings.** ANON. *Color Trade J.* 8, 174(1921).—After removal of sizing, weighting and other extraneous matter, the ash of top-chromed fabric will seldom exceed 1%, whereas bottom-chromed fabric may contain 1.5 to 3% ash.

CHAS. E. MULLIN

**Dyeing the batik style.** I. BARRINGTON DE PUYSTER. *Color Trade J.* 8, 128-31 (1921).—The principles of batik dyeing and a description of the app. used. II. *Ibid* 162-6.—Resists, dyes and dyeing methods used. III. *Ibid* 207-11.—Dyeing technic for cotton, linen and silk. Prepn. of resist waxes. IV. *Ibid* 9, 25-31(1921).—App. used and the removal of resists. Older Javanese dyes used. CHAS. E. MULLIN

**Effects of alkalies in dyeing with vat dyes.** LEO KOLLMANN. *Textilber.* 2, 379-81 (1921).—An address.

W. F. FARAGHER

**The estimation of indigotin.** WILLIAM THOMSON. *J. Soc. Dyers Colourists* 37, 166-8(1921).—A discussion of the several methods published since 1869 is followed by details of T.'s method. Dry a 1-g. sample of the paste and treat in a 150-cc. beaker with 15 cc. concd.  $H_2SO_4$ . Wash any color adhering to the beaker into the bottom with 15 cc. more  $H_2SO_4$  and heat to 50° for 3 hrs. Cool, make up to 1 l., take 200 cc., add 800 cc.  $H_2O$  and titrate with 0.02 N  $KMnO_4$  to a golden yellow color. Several tables of results are given. Cf. *C. A.* 6, 297.

CHAS. E. MULLIN

**Silk in its relation to dyestuffs.** EMILE CAGLIOSTRO. *Color Trade J.* 10, 1-5 (1922).—A discussion of the theory of silk dyeing, inclining toward the physical affinity of the dyestuff for the silk in most instances.

CHAS. E. MULLIN

**Organic acid for printing and dyeing.** A. J. HALL. *Textile Colorist* 43, 741-3 (1921).—A discussion of the work of Becke (*C. A.* 16, 2410) and Carpenter (*C. A.* 15, 2361).

CHAS. E. MULLIN

**Notes on cellulose-acetate and viscose silks.** E. CLAYTON. *J. Soc. Dyers Colourists* 37, 301-4(1921).—Acetate silk is sol. in acetone, incompletely sol. in  $CHCl_3$ , and insol. in  $CCl_4$ . This indicated that the commercial silk belongs to the category of mixed sulfate acetates. The silk swells, loses luster and strength, becomes softer, more pliable, and shrinks in length by boiling 1-2 min. in  $H_2O$ . It appears to retain traces

of solvent very tenaciously. Boiling 1-2 min. in 5% NaOH removes the luster and gives the silk a yellow color which is removed by washing. It swells in, but is much less affected by cold 10% NaOH than viscose silk. It has little affinity for substantive dyes. It is suggested that it may be used in testing for the presence of uncombined aromatic amines, etc., in substantive dyes. Viscose silk weakens upon boiling in H<sub>2</sub>O but otherwise appears unaltered. It does not lose luster when boiled with 5% NaOH, as does the acetate, but becomes more yellow and is greatly weakened. Its strength is partially regained upon drying. Cold 10% NaOH disintegrates it. It has a more powerful reducing action than the acetate. In dyeing it resembles mercerized cotton in many respects. The dyeing of both varieties of artificial silk is discussed. Cf. *C. A.* 16, 2226.

CHAS. E. MULLIN

**The degumming of silk.** I. EMILE CAGLIOSTRO. *Color Trade J.* 8, 138-41 (1921).—Impurities removed by and relative advantages of the frothing and soap soln. methods, and the selection of soap are discussed. II. *Ibid* 171-4.—Details of the prepn. of ecru, soupled and boiled-off silks. III. *Ibid* 212-5.—A discussion of degumming tussah and silk waste. Treatment of the boiled-off liquors and app. used in degumming.

CHAS. E. MULLIN

**The bleaching of silk.** I. EMILE CAGLIOSTRO. *Color Trade J.* 9, 13-6 (1921).—Methods are given for bleaching silk with aqua regia, SO<sub>2</sub>, NaHSO<sub>3</sub>, peroxides, KMnO<sub>4</sub>, and perborates. Na percarbonate and (NH<sub>4</sub>)<sub>2</sub>S<sub>2</sub>O<sub>8</sub> are mentioned. Six illus. II. *Ibid* 68-72.—Methods of bleaching tussah and half-silks; after treatment of the bleached silk; scrooping, shaking-out, stringing and lustering are discussed. CHAS. E. MULLIN

**Notes on cotton bleaching.** BARRINGTON DE PUYSTER. *Color Trade J.* 9, 132-4 (1921).—A discussion of the loss in wt., change in length, breadth and strength of cotton and linen during bleaching; and the absorbent qualities of bleached cotton.

C. E. M.

**Bleaching and dyeing of jute.** E. DUHEM. *Color Trade J.* 9, 134-7 (1921).—Formulas are given for bleaching, dyeing and printing jute. CHAS. E. MULLIN

**For and against carbonizing.** A. GANSWINDT. *Textilber.* 3, 259-60 (1922).—Carbonizing with H<sub>2</sub>SO<sub>4</sub> is entirely safe and wool suffers no injury in a properly conducted process. Damage is attributable to carelessness or lack of knowledge of correct methods.

W. F. FARAGHER

**The ash content of cotton fabrics which have been laundered many times.** P. HEHRMANN AND SOMMER. *Textilber.* 3, 238 (1922).—Pieces of bleached cotton were laundered with regular lots of soiled articles in a commercial laundry. The washing process consisted of a preliminary washing for 30 min. with soap and Na<sub>2</sub>CO<sub>3</sub> at 40°, a rinse with water (original hardness of 23°) softened by a zeolite filter to 2-3°, a second washing with soap and soda ash continued for 30 min. at 85-90°, several rinses with the softened water and a final rinse with the hard water. At the end of each ten washings, ash detns. were made. Expressed as a % of the wt. of the cloth in air having a humidity of 65, the increase in % of ash is 1.2-1.3% per ten successive washings. The soap used was free from water-glass.

W. F. FARAGHER

**Investigation of the cuticle of cotton.** R. HALLER. *Text. Forschg.* 3, 20-6 (1921).—A film of Cu ferrocyanide, produced on small rods of cellulose gel sepd. from a viscose soln., was treated with ammoniacal Cu oxide soln.; the outer lamella remained unattacked, but complete loosening of the membrane resulted in a short time. From the membrane fragments the Cu ferrocyanide was slowly dissolved by NH<sub>3</sub>, and an opaque mass of the original gel remained, which dissolved readily in ammoniacal Cu oxide. Iron and zinc ferrocyanide behaved similarly. Conclusion: The cuticle does not consist of an independent membrane, but it includes the outer sheath of the fibers,

consisting of cellulose, which becomes modified owing to incorporation of cutin. The cuticle is regarded as an adsorption compd. produced by adsorption of the cutin substances by the cellulose. J. S. C. I.

**Methods for the preparation of fibers.** HERTHA FLEISCHER. *Faserforschung* 2, 63-76(1922).—An alphabetical (by author) list of 116 patents (mostly German) dealing with the processes of retting and digesting raw materials is given. This is followed by an alphabetical list of the materials or processes used, with patent reference.

C. J. W.

**Detection and estimation of acidity and alkalinity in cotton fabrics.** H. F. COWARD AND GLADYS M. WIGLEY. *J. Text. Inst.* 13, 121-6(1922).—Neutral bleached cotton fabric free from size and from oxycellulose was prepd. and specimens were soaked in dil. NaOH and in dil. HCl, resp., for several hrs. The alk. specimen was removed to a silver beaker and the acid specimen to a quartz beaker and both were extd. repeatedly with boiling water until after drying they gave the same reaction to spot tests with indicators, except a slight difference with methyl red. Neither specimen was more removed from neutrality than 0.005% alkalinity or acidity, resp. Com. fabrics after desizing may be washed to a similar neutrality. Quant. testing according to the specifications of the Brit. Eng. Standards Assoc. was inaccurate as but 2 extns. with boiling water were made, and the liquid ext. was titrated after removal of the cloth, the latter retaining up to 0.05% of its wt. of acid which was enough to cause tendering. Better results were obtained by titrating in the presence of the cloth. In this method the samples were made neutral; a known amt. of HCl or H<sub>2</sub>SO<sub>4</sub> was added and the titration made in the presence of the cloth with phenolphthalein indicator and 0.02 N NaOH at the boil until a faint red persisted for 10 min., the flasks being loosely stoppered. If the cloth possessed acid-neutralizing properties due to the presence of CaCO<sub>3</sub> a measured excess of 0.02 N H<sub>2</sub>SO<sub>4</sub> was added, boiled 10 min. and titrated back with alkali to standard pink. NaOH taken up by the fabric was estd. by titration with 0.02 N acid. The results were correct to within 0.02%. In spot tests for acids methyl red, KI-KIO<sub>3</sub>-starch, and lacmoid were the most sensitive. Spot tests for alkalies were best shown by methyl red and bromothymol blue. L. W. RIGGS

**Estimating the value of dextrin for cloth dressing.** H. POMERANZ. *Monatschr. Textilind.* 37, 14-6, 33-5(1922).—In the prepn. of the dextrin the conversion of the starch should be effected only to such an extent that a soln. of the product on evapn. yields a residuc of the desired transparency. The dextrin should give a red-violet coloration with I soln.; a hot soln. of the dextrin should remain clear on cooling, except for traces of a flaky residuc; the sugar content should be 3-5% and should never rise above 10-12%; only a slight turbidity should appear on the addn. of tannin soln.; the residuc obtained by evapg. a soln. should be glassy and transparent, and give a soln. similar to the original on redissolving; and dressed samples of cloth should show only a slight dampness in a moist atm. J. S. C. I.

**Some causes of the staining of fabrics with some remarks on molds.** E. J. SIDEBOTHAM. *J. Soc. Dyers & Colourists* 38, 97-9(1922).—A report on stains caused by the fungus *Botrytis* present in slightly decayed wood upon which the cotton fabric had been wrapped. Pitch present in Hessian union packing also caused stains on an ocean shipment of cotton goods. CHAS. E. MULLIN

**Waterproofing by electricity.** ISMAR GINSBERG. *Color Trade J.* 11, 1-6(1922).—A general description of the Tate process of waterproofing and finishing, wherein the Al oleate deposited upon the fiber, as in the usual waterproofing process, is electrolyzed, forming a basic Al oleate and depositing Al(OH)<sub>3</sub> in the pores of the fiber, thus rendering it permanently water resistant. The process is applicable to all fabrics from all fibers, and they can be washed or dry cleaned after waterproofing without injury. C. E. M.

**Mordanting wool for hematin.** A. B. CRAVEN. *J. Soc. Dyers Colourists* 38, 108-11; *Am. Dyestuff Rep.* 10, 406-9(1922).—Hematin is sensitive to oxidation by  $\text{CrO}_3$  and reduction by  $\text{H}_2\text{SO}_4$ . Expts. show that in some cases 20% of the hematin may be destroyed by unreduced chrome on the mordanted wool. This destruction may be avoided and the light fastness of the dyed fabric much increased by completely reducing the chrome.  $\text{NaHSO}_3$  is the cheapest means of reduction but the excess of  $\text{H}_2\text{SO}_4$  should be removed to avoid further loss by reduction of the hematin. This acid may be removed by a  $\text{Na}_2\text{CO}_3$  treatment, which is also an aid in the dyeing by rendering the chrome fully basic, giving deeper, brighter and faster blacks. Lactic acid exhausts the chrome bath and reduces at the same time when used in the proper proportion, but a  $\text{Na}_2\text{CO}_3$ ,  $\text{NH}_4\text{OH}$  or  $\text{Na}_2\text{B}_4\text{O}_7$  treatment further improves the dyeing.

CHAS. E. MULLIN

**The sizing of cotton warps.** G. SMITH. *Color Trade J.* 8, 147-52(1921); *Textile Colorist* 43, 190-2, 335-6, 473-4, 599-600, 688-9, 764-6, 832-4(1921); 44, 39-41(1922).—A description of the various materials and their uses in the manuf. of sizes. C. E. M.

**Constituents of raw wool in relation to scouring.** JOHN MACGREGOR. *Color Trade J.* 9, 97-102(1921).—A discussion of the impurities usually found in raw wool and the methods of removal. A soln. of 3 to 5 parts of aniline in 100 of  $\text{H}_2\text{O}$  is mentioned for the removal of pitch. Pyridine and quinoline also may be used. C. E. M.

**Notes on some recent improvements in the finish of linen and cotton goods.** M. FORT. *J. Soc. Dyers Colourists* 37, 161-6(1921).—Some of the results obtained by the mercerization of linen are discussed in connection with the Lumac finishing process, but no details are given. The solvent extrn. process of scouring when used only as a bleaching aid is seldom justified, as an alkali treatment must also be given to remove non-waxy impurities in the goods and the increase in bleaching efficiency due to the extrn. is very little. When the goods are to be beetle-finished a new factor enters, and goods which are solvent-extrd. finish up much better, because of the complete absence of waxes, etc.

CHAS. E. MULLIN

**Pectin substances of flax.** ERICH CORRENS. *Faserforschung* 1, 229-40(1921).—The pectin substances of flax contain as an essential constituent hexose groups with galactose and a *d*-galacturonic acid as well as an araban grouping, which is easily hydrolyzed. The latter group contains arabinose and a methylpentose. Expts. with *Radix gentianae* indicate that the occurrence of methylpentose as a component of the araban grouping is general in the pectins. Flax pectin in soln. is dextrorotary, which rotation is increased on removal of the araban group. The MeO content of the pectins varies with the method of prepn. but is const. for uniform treatment. The difference in different pectins is connected with the part of the plant from which the pectin is derived. It is not correct to assume that there is 10% MeO in pectin and to est. the content of pectins from this assumption.

C. J. WEST

**Crêpe effects on delaines.** C. FAVRE. Sealed Note 1500. *Bull. soc. ind. Mulhouse* 87, 65(1921).—Report by A. WOLF. *Ibid* 66-7.—Unbleached delaine is passed through cold water and is then steeped in a bath contg. 20 g. of Ba thiocyanate and 6 g. of  $\text{H}_2\text{SO}_4$  of 65° Be. (sp. gr. 1.82) per l., the temp. of which is raised during 15 min. to 75° and maintained for 1 hr. The fabric is washed so as to develop crêpe effects, chlored, bleached by immersion for 15 mins., at 75°, in a bath contg. bisulfite of 30° Be. (sp. gr. 1.265), dild. 15 times, printed, washed, and finished. The crêpe effects develop after 8 days. Wolf points out that the fabric must not be under tension during the process and that the thiocyanate may be dispensed with, since dil.  $\text{H}_2\text{SO}_4$  or even water alone produces similar effects.

J. S. C. I.

**Fibroin, sericin and bast-soap.** A. GANSWINDT. *Textilber.* 3, 244-5(1922).—No investigator has yet proved whether or not the material from which the silk worm

spins the cocoon is a single chem. compd. Physiol. considerations indicate that the material is originally one substance. The behavior of silk during the process of boiling-off, however, seems to prove the presence of two substances: sol. sericin and insol. fibroin. It is possible that this difference in soly. is caused by oxidation and hydration of the outer portion of the fibers. "Cracked" (acid) bast-soap baths have been recommended and used for producing level shades. Expts. of G. show that dyeings made without bast-soap equal those made with it. Castile soap and gelatin equal boiled-off liquor or bast-soap, for dyeings made with dyes which produce level shades with great difficulty.

W. F. FARAGHER

The action of iodine upon cellulose, silk and wool (HUEBNER, SINHA) 23. The fluorescence of cellulose and its derivatives (LEWIS) 3. Synthesis of anthraquinone (HARDING) 10.

***o*-Hydroxyazo coloring matters.** SOCIÉTÉ ANON. POUR L'INDUSTRIE CHIM. A BALE. French 22,347. Diazotized anthranilic acid is combined with pyrazolones contg. a hydroxyl group in the aryl portion of the mol., or diazotized aromatic amines which do not contain a hydroxyl or carboxyl group in the *o*-position to the amino group are combined with pyrazolones contg. a hydroxyl or carboxyl group in the aryl portion of the mol. Coloring matters are obtained: From *o*-diazotized anthranilic acid and 1,5'-sulfo-2'-hydroxyphenyl-3-methyl-5-pyrazolone-3'-carboxylic acid,  $\text{CO}_2\text{H} \cdot \text{C}_6\text{H}_4(\text{SO}_3\text{H})\text{OH} \cdot \text{C}_3\text{N}_2\text{H}_2\text{O}$  (from 5-sulfo-2-hydroxy-1-hydrazinobenzene-3-carboxylic acid and ethyl acetoneacetate). From diazotized chloroanthranilic acid ( $\text{NH}_2 : \text{CO}_2\text{H} : \text{Cl} = 1 : 2 : 4$ ) and 1,5'-chloro-3'-sulfo-2'-hydroxyphenyl-3-methyl-5-pyrazolone (from 5-chloro-3-sulfo-2-hydroxy-1-hydrazinobenzene and ethyl acetoneacetate). From diazotized sulfoanthranilic acid ( $\text{NH}_2 : \text{CO}_2\text{H} : \text{SO}_3\text{H} = 1 : 2 : 5$ ) and 1,5'-nitro-2'-hydroxyphenyl-3-methyl-5-pyrazolone (from 5-nitro-2-hydroxy-1-hydrazinobenzene and ethyl acetoneacetate). From diazotized sulfoanthranilic acid and 1,4'-hydroxyphenyl-3-methyl-5-pyrazolone-3'-carboxylic acid. From diazotized sulfanilic acid and 1,4'-hydroxyphenyl-3-methyl-5-pyrazolone-3'-carboxylic acid. From diazobenzene and 1,5'-chloro-2'-hydroxyphenyl-3-methyl-5-pyrazolone-3'-carboxylic acid. From *m*-diazobenzoic acid and 1,5'-sulfo-1'-hydroxyphenyl-3-methyl-5-pyrazolone-3'-carboxylic acid. From 1-diazonaphthalene-5-sulfonic acid and 1,4'-hydroxyphenyl-3-methyl-5-pyrazolone-3'-carboxylic acid. 5-Chloro-2-hydroxy-1-phenylhydrazine-3-carboxylic acid (obtained by reduction of diazotized 4-chloro-2-amino-1-hydroxybenzene-6-carboxylic acid) gives with ethyl acetate 1,5'-chloro-2'-hydroxyphenyl-3-methyl-5-pyrazolone-3'-carboxylic acid. Most of the compds. obtained are fast yellow dyes.

**Machine for drying and crushing dyestuffs.** DAI-ICHI GOTÔ. Jap. 38,751, May 26, 1921.

**Cuprammonium cellulose solutions for spinning.** P. H. MINCK. U. S. 1,421,707, July 4. Cupric salts present in the solns. are reduced and dehydration of the cellulose is effected by sugars of the grape sugar class and the cellulose is hydrated by cane sugar. The sugars are used in amts. of 0.25-2.5% the wt. of the cellulose.

**Stiffening textile fabrics.** O. LOBECK. U. S. 1,421,700, July 4. A sol. compn. comprizing gelatin mixed with  $\text{Na}_2\text{CO}_3$  and  $\text{H}_3\text{BO}_3$  is used for stiffening linen or other textile materials.

**Removing starches and gums from textile materials.** J. TAKAMINE and J. TAKAMINE, JR. U. S. 1,421,613, July 4. Textile materials such as yarns or threads are treated with enzymes produced by *Eurotium oryzae* or other material contg. proteolytic and diastatic enzymes to dissolve starches and gums and render them capable of being removed by washing with  $\text{H}_2\text{O}$ .

**Sizing for fibrous materials.** D. MCGILL. U. S. 1,421,703, July 4. A compn. adapted for treating coconut fiber to render it resilient and suitable for use in mattresses is prepd. from glue 1 lb., KCl 0.125-1.0 oz., NaOH 1 dram, black treacle 1 lb., graphite 1-2 oz., K alum 2 oz. and  $H_2O$ .

## 26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

**The production of titanium oxide and its use as a paint material.** NOEL HEATON. *J. Roy. Soc. Arts* 70, 552-65(1922).—A brief history of the discovery of Ti, and of the use of  $TiO_2$  as a pigment is given. In Norway, the ore found near Egersund is mainly a variety of ilmenite, of the formula  $Fe(Mg)TiO_3 + 10Fe_2O_3$ , together with magnetite, hypersthene, and apatite. The crude ore is mechanically concd. to about 47.5%  $TiO_2$ , pulverized, mixed to a paste with concd.  $H_2SO_4$ , and after decompn., it is disintegrated and leached with  $H_2O$ .  $BaSO_4$  pulp is added to the soln. of Ti and Fe sulfates, and on heating the Ti ppts. on the  $BaSO_4$  as hydrated oxide while all the Fe stays in soln. The ppt. is then calcined, and ground. The commercial pigment contains 25%  $TiO_2$  and 75%  $BaSO_4$ ; its slight yellowish color, heretofore supposed to be due to residues of Fe, has been traced to the formation of small quantities of rutile during calcination. This is entirely prevented if a small proportion of the Ti is present as phosphates. Relative opacity,  $n$ , and sp. gr. of the white pigments are given. Calcination converts the Ti from the amorphous to the microcrystalline state and increases its  $n$  from 1.8 to 2.71, and the  $n$  of the calcined  $TiO_2$ - $BaSO_4$  mixt. is far above the mean  $n$  of the two constituents. This is probably due to the coating of the  $BaSO_4$  particles with highly refracting  $TiO_2$  inter-crystd. with low refracting  $BaSO_4$  to produce additional reflecting surfaces within each particle; and thereby increasing the opacity of the pigment. Exposure tests on paints contg. all available white pigments in every combination show that Ti white used alone has a tendency to chalk, but when used with ZnO gives an extremely durable film. (Cf. Titanium, its production, properties, and uses. W. F. Washburn and J. McGougan. *Proc. Paint & Varnish Soc.* March 1921). Discussion follows. F. A. W.

**Pitting in black baking japans.** P. E. MARLING. *Paint, Oil & Chem. Rev.* 73, No. 26, 10-11(1922).—The most common cause of pitting in black baking japans was traced to the stearin, which finds its way into some japans through the use of stearin pitch or candle-tar, cotton seed pitch, crude and "summer" fish oils, etc. At low temps. the stearin crystallizes out of the japan as small globules which melt when the film is baked and thereby cause the pit marks. Stearin is more sol. in light than in heavy naphthas, so that proper selection of solvents will help prevent pitting. If the product contains a low per cent of stearin, pitting may be prevented by storing the japan in a room not below  $15^\circ$ ; and if a japan has already developed pitting it can be overcome by heating to  $170$  to  $200^\circ F.$ , but the reheated japan usually has impaired flowing properties so that it does not give an even surface. (Cf. *C. A.* 16, 2034.) F. A. WERTZ

**Process for making pale elastic coumarone resin.** G. SCHNEIDER. *Ber. Ges. Kohlentechnik* 1921, 39-41.—To obtain very pale and elastic coumarone resins it is not only necessary to keep the temp. low during the polymerization process, but also during the evapn. of the solvent. High-boiling solvents can be evapd. at comparatively low temps. by passing a gentle current of air over the material. By keeping the temperature at  $90^\circ$  a very pale coumarone-resin with a softening point of  $80^\circ$  can be made, with an evapn. loss of only 2% of solvent. J. S. C. I.

**The spontaneous decomposition of linoxyn.** F. ULZER. *Oel- u. Fettind.* 1920, 412.—When extremely thin, dry boiled oil films are exposed for a short time in an atm. contg. Cl or Br, bleaching, followed by the development of a red coloration, takes place.

After two months the solidity diminishes and stickiness begins to develop. In a further month the films change to an extremely viscous liquid. Absence of air and a high degree of atm. moisture accelerate the change. By omitting the preliminary treatment with halogens, the change to the liquid condition is much slower. J. S. C. I.

**Linoleum.** FERMO VERTOVA. *Textilber.* 3, 270-1(1922).—A historical discussion and brief outline of factory methods are given. W. F. FARAGHER

**Comparative investigation of phenol-aldehyde condensation products as substitutes for shellac in polishes and polishing varnishes.** EWALD FONROBERT. *Chem.-Ztg.* 46, 513-4(1922).—Very few commercial shellac substitutes consisting of phenol-aldehyde condensation products, have the desirable qualities of natural shellac. The films produced by most of them remain tacky or are very brittle. The presence of cresol residues prevents proper drying, imparts elasticity, and causes yellowing of the film on exposure to light. M. p., color, odor, residue on heating to 150°, acid no., soly., character of film produced, etc. are tabulated opposite the trade name and manufr. of the various samples examd. F. A. WERTZ

**Blackness of ink spots on paper.** W. MECKLENBURG. *Mitt. Materialprüfungsm.* 38, 35-62(1920).—The resistance of ink spots to the action of water and alc., and the action of the light from a Hg quartz lamp, was studied and numerically defined by the use of a Tyndallmeter as described previously (*C. A.* 10, 1101). Spots of iron gallate ink were fast to the action of water and 50% alc.; from spots of fancy colored ink (contg. aniline dyestuffs) the color was extd. by both liquids. Iron gallate ink spots were fairly fast to the light from a Hg quartz lamp, while fancy colored ink spots were quite unstable. Of two logwood inks one behaved in a similar manner to iron gallate ink and the other to the fancy colored inks. J. S. C. I.

**Cnicus benedictus** oil (for varnish manufacture) (FERENEZ) 27. Lead and zinc pigments and salts in 1921 (SIEBENTHAL, STOLL) 18.

**Paint.** C. A. WARD. U. S. 1,421,625, July 4. A paint is formed of a pigment mixed with Al and Zn stearates and a vehicle, e. g., vegetable oil.

**Brown pigment.** P. FIREMAN. U. S. 1,420,985, June 27.  $\text{Fe}(\text{OH})_2$  is pptd. from a ferrous salt soln. and the soln. and ppt. are heated together and exposed to the action of air for 10-15 hrs. Cf. *C. A.* 16, 505.

**Tar paint.** J. B. MCCARTNEY. U. S. 1,421,970, July 4. A paint for metals, paper, wood, brick or cement is formed of gasoline 8 oz.,  $\text{CS}_2$  1 oz., paraffin oil 1 oz., sufficient coal tar to make the mixt. up to a total of 1 gal. and comminuted clam or mussel shells to thicken the mixt.

**Printing ink.** H. A. BUCK. U. S. 1,421,125, June 27. A non-inflammable printing ink is formed of a pigment such as a Mn pigment mixed with a binder of shellac, borax and  $\text{H}_2\text{O}$ .

**Black stamp-dye for documents.** J. SCHIFFMANN. U. S. 1,421,728, July 4. See *Brit.* 172,588 (*C. A.* 16, 1512).

**Linoleum-like material.** R. JRSCHKE. U. S. 1,421,086, June 27. A rubber-like material is formed by the reaction of gelatin and  $\text{H}_2\text{O}$  on glycerol, and heated and kneaded with a phenolic formaldehyde condensation product and filler such as cork meal and pigment and the product is rolled into sheets.

## 27—FATS, FATTY OILS AND SOAPS

E. SCHERUBEL

**Hardening of fats.** F. ULLER. *Oel- Fettind.* 1920, 367.—Parts of a fat-hardening plant were cleaned with petroleum spirit and  $C_2HCl_3$ , and traces of the solvent were inadvertently left in the plant. Very poor results were obtained in the subsequent hardening process. When the traces of solvent were removed normal results were obtained.

J. S. C. I.

**Physiological and pharmacological examination of hydrogenated vegetable oils (cottonseed, arachis, linseed, and sesame oils) and of unhardened sesame oil.** R. ROST. *Arbb. Reichs-Gesundh.-Amt.* 52, 184-209(1920).—The hardened oils are similar in their physiol. action to the unhardened oils, and exhibit no harmful properties; they should contain practically no Ni and As; the minute traces of Ni always present, and those of As which occasionally occur cannot be regarded as injurious.

J. S. C. I.

**Uniform methods in the chemical examination and technical evaluation of fats, oils, waxes and resins.** A. EIBNER. *Chem. Umschau* 29, 193-5(1922).—Most of the so-called const. of fats and oils det. a whole group of similar substances without sepg. them quant., and any conclusions drawn are, therefore, more or less indefinite. A sharper knowledge is obtained from quant. detns. of individual substances such as tetra- and hexabromides. Recent cases in which pure linseed oils of normal I no. were found to be non-drying, and in which varnishes from pure Chinese wood oil of medium I no. were found to dry with extraordinary speed point to the necessity of the knowledge of the constitutions of oil and fat constituents.

P. ESCHER

**Determination of acid value of fats and fatty acids by conductivity measurements.** R. KREMANN AND F. MUSS. *Seife* 7, 161-7(1921).—The detns. were made in alc. soln. and gave results agreeing with titrations with phenolphthalein as indicator and with the theoretical values except in the cases of caproic and ricinoleic acids, the anomalous behavior of which is attributed to the presence of impurities. 0.1 N alc. NaOH was used with fats, 0.5 N with the fatty acids. The pptn. of soap causes variations in the cond. when near the neutral point. The titration is best carried out at room temp.

J. S. C. I.

**Determination of the melting point of neutral fats.** LOUIS RACINE. *Mat. grasses* 14, 6146-7(1922).—R. recommends as a standard method that of Buis (Chercheffski corps gras et cires, p. 168) which is as follows: Fill a glass tube 3 mm. in diam. and 3.25 cm. long to a depth of 1 cm. with fat and allow to stand for 24 hrs. Attach the tube to the bulb of a thermometer by means of a rubber band and place in a beaker of  $H_2O$  in a 2nd beaker to form a  $H_2O$  bath. Heat so that the temp. rise is 0.5 degree per min. The temp. at which the  $H_2O$  pressure raises the fat in the tube is the m. p.

E. S.

**The oil industry of Japan and Manchuria.** R. OCKEL. *Chem. Umschau* 29, 201-2(1922).—An account is given of the extent of the industry and of the methods of pressing the oil or extg. it by solvents from soy beans, with data of yields, losses, etc.

P. ESCHER

**Does the quality of pressed oil differ from that of extracted oil?** H. DUBOVITZ. *Seifensieder Ztg.* 49, 401(1922).—The two products from sunflower seed were analyzed. The quality of the two oils is identical; with careful operation either method gives good results.

P. ESCHER

**Liver oil of the tope.** A. C. CHAPMAN. *Analyst* 47, 203-4(1922).—The tope, *Galeus galeus*, occurs on all the coasts of the British Isles; it belongs to the shark family. The const. of the liver oil are:  $d_{44}$  0.9249, I no. 152.2, sapon. no. 185.1, unsaponifiable 1.14%,  $n_D^{20}$  1.4803,  $n_D^{25}$  1.4778, specific dispersion ( $n_D^{25}-n_D^{20}$ ) 0.0101, brominated glycerides insol. in ether 42.5%.

E. SCHERUBEL



**Kapok oil.** W. H. DICKHART AND H. P. TREVITHICK. *Am. J. Pharm.* **94**, 34 (1922).—A sample of this oil contained moisture 0.45, insol. impurities 0.36%, d. 0.9221, I value (Wijs) 94.9, sapon. value 194.5,  $n_D^{20}$  1.4710, unsapon. matter 0.66%, free fatty acids 12.13, refining loss 35%, (color of refined oil 35 yellow, 7.0 red); titer of refined oil 28.1°, titer of soapstock 30.2, Halphen test positive, strong, immediate. The Halphen color appeared just as fast as if the sample was cottonseed oil, showing a reddish tinge before the  $CS_2$  had left the oil.

W. G. GANSSLER

**The betrata, a new oil plant from Madagascar.** F. HEIM, E. GARRIGE AND M. HUSSON. *Bull. agence gén. col.* **12**, 679-91(1919); **13**, 14-21(1920).—The seeds of betrata (*Ricinodendron mahafalense*) yield 81.4% of kernels and 18.6% of husks. The oil yield is 44.64% of the entire fruit or 57.68% of the decorticated nuts. The cake from the undecorticated nuts is poisonous. The oil has a pale golden yellow color, semi-drying, and consists entirely of triglycerides of stearic and oleic acids with a small quantity of triglycerides of volatile fatty acids and hydroxy acids. It gives a good hard soap when mixed with copra and lard and is specially valuable for soap-paste for the textile industry. The cake contains N 5.43,  $K_2O$  1.236,  $P_2O_5$  1.589%. J. S. C. I.

**Ergot oil.** K. GANDER AND J. ZELLNER. *Seife* **6**, 411-12(1921).—A freshly gathered sample of ergot from Obersteiermark on extr. with petroleum ether yielded only 21% of oil. The sapon. value was 196.2, as compared with the only previously recorded figure of 180. The neutralization value of the insol. fatty acids (194.8) and the acetyl sapon. value (248.7) were similar to those of a sample that had been kept for 10 years. The acetyl value (86.6) was, however, higher in the case of the fresh oil. The acetyl acid value was 162.1. The acetylation cannot, however, have been complete, since the fatty acids recovered by sapon. had the same values as usual. The m. p. of the fatty acids was 39.5°, solidification p. 38.6-36.5° (capillary method.) J. S. C. I.

**Cnicus benedictus oil.** A. FERRENEZ. *Seife* **7**, 452(1922); cf. *C. A.* **14**, 228.—The characters of the oil are:  $d_{15}$  0.9255,  $n_D^{25}$  1.4653, sapon. value 196.5, acid value 16.6, and I value 139.6. A thin layer on a glass plate had not dried after 24 hrs. The oil is thus a semi-drying oil, similar to hemp oil, and is suitable for the manuf. of soap and varnish.

J. S. C. I.

**The so-called rapic acid.** A. GRABNER. *Seife* **7**, 167-8(1921); cf. *C. A.* **16**, 1512.—Portions of 100 g. of rape oil were saponified with 400 cc. of 10% alc. KOH, the acids liberated with dil.  $H_2SO_4$ , washed, dissolved in alc. and pptd. with alc. Zn acetate. After standing for 24 hrs. the soln. was filtered and the ppt. washed with alc. The Zn salts were extr. several times with cold ether, and most of the ether was distd. off from the combined extr. The residue was recrystd. from alc. The acid was then liberated with tartaric acid. The const. for this acid show without doubt its identity with ordinary oleic acid. Rapic acid has therefore no sep. existence.

J. S. C. I.

**Studies in the saponification of oils and fats.** H. M. LANGTON. *J. Oil Colour Chemists' Assoc.* **5**, 41-76(1922).—A review of the theory of sapon., of the acid, Twitchell, fermentation, and autoclave processes, of the importance of emulsification in sapon., and of the rate and extent of sapon., is given with bibliography. The progress of the reaction by the autoclave process on tallow, palm oil, palm kernel acid oil, linseed oil, and whale oils was detd. In each case sapon. was carried out under const. steam pressure of 8 atms. on 3 tons of the oil or fat. The amt. of CaO or MgO was 2.5% by wt. of the oil, and the operation was continued 10 hrs. from the time the working pressure was attained. Samples were drawn every hour to det. the extent of sapon. The tabulated and plotted results show that the progress of sapon. is arrested at the 4th to 6th hr. by a tendency for equilibrium to be established. MgO causes sapon. to take place more quickly and to a greater extent than CaO with tallow, palm kernel acid oil and whale oils, but the reverse with palm oil. With linseed oil, MgO and CaO gave identical

rates. In the first few hrs. tallow splits the most quickly, and then in order come whale, linseed, palm, and palm kernel acid oils. Beef tallow splits much more quickly with CaO than does mutton tallow. The rate of sapon. for whale oils is in order, grade No. 1, No. 2, and No. 3, whether CaO or MgO is used. No practical advantage, but rather a loss of time, resulted when the glycerol soln. was blown from the autoclave after 4 or 5 hrs., when equil. begins to arrest the progress of sapon. The av. extent of sapon. on 625 charges of 3 tons each of various oils and fats are tabulated. Discussion.

F. A. WERTZ

**A simplified Goldschmidt titration method for determining the total fat in soap.** M. JAKES. *Seifensieder Ztg.* 49, 431-2(1922).—The error of using petroleum ether for detg. total fatty acids in soap by the official "Verband" method lies in the fact that petroleum ether does not dissolve all of the rosin constituents, or any hydroxy acids from oxidized fats. J. proposes the following modification of Goldschmidt's titration method: (1) Acidify 7-10 g. of the soap, shake out with ether, wash the ether soln. free from acid and titrate, together with its alc. washings, with phenolphthalein against approx. 0.5 N alkali. (2) Titrate the washed fatty acids, as obtained from the titer detn., with the above approx. 0.5 N alkali and calc. the % of total fatty acids by dividing the number of cc. 0.5 N alkali required for 1 g. of soap by the no. of cc. 0.5 N alkali required for 1 g. of the acids.

P. ESCHER

**The determination of the turbidity point of soap solutions.** W. HERBIG. *Z. deut. Oel-Fett-Ind.* 42, 393(1922).—For the purpose of uniformity of results in the hands of different analysts H. proposes to make the turbidity test of soap solns. on a 2% soln. of the anhyd. soap. He uses an app. similar to that usually employed for the m. p. detn. of fats. Heat the soap soln. until clear, remove the flame and stir the soln. until the first turbidity appears. The following results are recorded for a "Marseille" soap; 1%, 51° and 52°; 2%, 54° and 53.5°; 3%, 55.5° and 55°; 4%, 57° and 56.5°; 5%, 59° and 58°.

P. ESCHER

**Recovery of glycerol from spent soap lyes.** W. E. SANGER. *Chem. Met. Eng.* 26, 1211-6(1922).—This article discusses the compn. of spent soap lyes and the removal of impurities by single and double treatments, the concn. of purified lyes in single-effect evaporators, and practical data on the equipment required and methods of operation necessary to obtain max. efficiency.

E. SCHERUBEL

**Constants of Indian beeswax.** O. D. ROBERTS AND H. T. ISLIP. *Analyst* 47, 246-51(1922).—Samples of wax from the provinces of Bengal, Eastern Bengal and Assam showed min., max., and av. consts., resp.: Sp. gr. 0.9555, 0.9733, 0.9652; m. p. 60.4°, 66.4°, 61.4°; acid no. 3.7, 7.6, 5.8; ester no. 87.4, 96.0, 92.1; ratio of ester no. to acid no. 12.2, 26.0, 16.7; I no. 4.5, 7.7, 5.6; Salamon and Seaber's test 52, 62, 57.6; hydrocarbons 6.9, 12.9, 9.8%. An outstanding feature of the results is the low acid no., the figures in many cases being lower than that regarded as representative of Indian beeswax, i. e., 6. Salamon and Seaber's test is also shown to be untrustworthy. According to these workers the clouding point is 56° for these waxes, and the addition of 5% of paraffin wax raises the point from 56 to 60-62° and 10% to 69-70°.

E. SCHERUBEL

**Soap having a marble-like pattern.** MASANOBU KAWADA. *Jap.* 39,522, Aug. 15, 1921. Common soap is crushed into small pieces and their surfaces are colored with suitable sulfide dyes. The pieces are then united by pressing or by slight heating.

## 28—SUGAR, STARCH AND GUMS

F. W. ZERBAN

**Comparative experiments with sugar beet seeds conducted in 1921 by the Central Association of the Czechoslovak Sugar Industry.** ANON. *Z. Zuckerind. Tschoslovak.*

*Rep.* 46, 141-50(1922).—From expts. on 12 diff. fields, 6 were completed with satisfactory results. The sugar content of the 7 varieties of beets thus tested varied between 20.92% and 19.87%; the yield of beets per hectare between 312.1q and 279.5q; the yield of sugar per hectare between 62.2q and 57.2q (cf. *C. A.* 15, 2010). J. M. K.

**Sugar cane experiments 1919-21.** J. DE VERTETRL AND L. A. BRUNTON. *Bull. Dept. Agr. Trinidad and Tobago* 19, 188-214(1922).—This report deals with (1) growing and testing of new Trinidad seedlings, (2) testing of varieties, (3) mosaic disease observations. Complete chemical analyses of the crop under each section are given in tabular form. R. B. DEEMER

**Deterioration of cane after cutting.** R. ELLIOTT. *Intern. Sugar J.* 24, 100 (1922); *J. Soc. Chem. Ind.* 41, 187.—The loss of wt. of cut cane varies with conditions, being accentuated by hot, windy weather. With burnt cane, variety Yellow Caledonia, it averages 3.10% per day, with unburnt cane 2.74%. Large samples, 40 stalks or more, must be taken to obtain concordant results in tests of this character. F. W. Z.

**Deterioration of cut canes.** L. PIROT. *Rev. agr. Maurice* 1, 74-5(1922).—Cut canes were subdivided into upper, middle, and lower parts of the stalk. Analyses showed that deterioration begins at the top and gradually spreads downward. No difference was found between nodes and internodes in degree of deterioration. F. W. Z.

**Sugar-cane wax.** P. DE SORNAY. *Rev. agr. Maurice* 1, 77-8(1922).—Mauritius canes contain less wax than canes of S. Africa. Plant cane often is richer in wax than ratoons. The % of wax also varies with the locality, in Mauritius from 0.044 to 0.086. F. W. ZERBAN

**Filtration in cane sugar factories.** M. RAIMBERT. *Louisiana Planter* 68, 398 (1922).—The use of more filtration in cane sugar factories is urged as a means of increasing purity and removal of scale-forming solids. The use of cloths is to be avoided, owing to the rapid clogging caused by small particles of bagasse and film. The best results are obtained by sand filtration. R. has perfected a sand filter with a capacity of 200 tons of cane per day which operates most efficiently. The film is horizontal and this scheme assists in keeping the head of the filter clean. Arrangements for washing the sand are given. C. H. CHRISTMAN

**Leaf type filters compared with plate and frame presses (in the sugar cane factory).** L. W. THURLLOW. *Sugar News* 1, No. 15, 21-6(1920).—Advantages claimed as the result of factory tests in a Philippine central are: The sugar in the cake may be washed out with less water, and more quickly; the difference between the purity of the unfiltered muddy liquid and the filtered juice is much less, and that between the filtered juice and the wash water is likewise less; one set of cloths may last the entire season; opening, closing, and cleaning can be done in about  $\frac{1}{3}$  the time; and lastly the capacity for equal filtering areas is about double. J. S. C. I.

**The liming of cane juice.** N. A. HELMER. *Facts About Sugar* 14, 74(1922).—The need for greater accuracy and efficiency in this process is emphasized. The analogy of this process to the softening of water is carried out, and the value of an accurate proportioner which is on the market is indicated. N. KOPELOFF

**Heating cane juices before liming.** MAURICE BIRD. *Louisiana Planter* 69, 61(1922).—The appearance of a siliceous ppt. in sirup is confirmed. This may be prevented by heating the juice to 220-240° F., liming and carrying out the process in the usual manner. The amt. of lime required for clarification is one half to one third that used by the old method. The yield and quality of sugar are improved. C. H. C.

**The practical manufacture of plantation granulated sugar and its by-product, molasses, in Louisiana.** V. H. ECKARD. *Louisiana Planter* 66, 122-4(1921).—The variety of cane does not affect the grade of sugar with good operation. Quality of sugar is not affected by the degree of extn., only quantity of sucrose extd. is of importance and

maceration water should always be clean water. In the production of white sugar cold maceration water is best, since hot water carries on the purple color which finds its way to the molasses. Liming and sulfuring may be practiced interchangeably, but sulfuring to 3.5–4.0 cc. acidity is very injurious in the manu. of white sugar. The juice should be limed back to 0.8–1.0 cc. Further sulfuring of sirup adds no value and is an unnecessary expense. Juice heaters giving 180–200° F. in the first heater with exhaust steam and live steam in the second heater are followed by heating in the open defecator to 212° F. This invariably adds to the quality of the final sugars. The removal of the blanket at the time of its forming is to be recommended. Brush pans are more desirable than bag filters. Scums from brush pans and mud from defecators should not be limed before pressing. The use of 2–3 lbs. of Filter-cel per ton of cane gives excellent filtration and a better filtrate. It is desirable to boil the juice to a Baumé of 28–30° since this gives as good a sugar as 24° Bé. sirup. The multiple-effect feed tank should never carry an excess of juice. The use of a sirup log is to be commended since it enables one to find any source of loss. In the boiling of the sirup careful vacuum control, heat application, the keeping of a very thin massecuite prior to boiling, proper graining, and molasses boiling all det. the quality of the sugar. Two boilings should exhaust a liquor and the wash and run-offs from the second boil should always be sepd., since only the wash can be used for No. 3 prime sugars. Molasses should never be blown up with live steam. Hot water and air used properly protect the molasses flavor and color. Bleach or phosphoric acid may improve the color but not the flavor. The use of crystallizers sacrifices the quality of molasses to obtain quantity production of sugar. The use of granulators is to be commended, but careful study of their operation might introduce greater economies.

C. H. CHRISTMAN

**Granulated sugar yields.** W. H. DUNSTONE, JR. and B. SANDMAN. *Louisiana Planter* 69, 39(1922).—The use of the small amt. of Norit as compared with a large amt. of bone black in the production of granulated sugar involves the handling of much less sweet water in a Norit house. This sweet water is not more than is required for melting down washed sugars. Pre-filtration is not necessary with Norit. The net results with Norit are satisfactory and justify the use of a carbon at the higher cost per ton.

C. H. CHRISTMAN

**Carbox in sugar manufacture.** C. J. GAMBEL. *Facts About Sugar* 14, 96(1922).—Carbox is a decolorizing carbon with special use in cane sugar production. The advantages and simplicity of the method are discussed.

N. KOPELOFF

**Cuban production increased by scientific methods.** S. F. MORSE. *Facts About Sugar* 14, 72–3(1922).—A description of how Central Constancia of the Cuban-American Sugar Company brought its crop up to more than 200,000 bags by adopting good cultural practice. The importance of agricultural investigations, working out of field plan, good farming, soil improvement, use of fertilizers and record of production are discussed.

N. KOPELOFF

**Data on equipment of sugar factories in Java.** P. A. JANSZ. *Arch. Suikerind.* 30, 33–5(1922).—Max., av., and min. capacity figures are given of all the app. used in defecation, sulfitation, and carbonation factories, without any discussion, in the form of tables, on the basis of 1000 piculs of cane ground.

F. W. ZERBAN

**Working up run-offs.** W. EDWARDS. *Rev. agr. Maurice* 1, 71–4(1922).—Tables and graphs are presented, showing the sugar yield obtainable by purging hot, directly after the massecuite is dropped from the pan, as compared to that obtained by cooling the massecuite in crystallizers, with the addition of a little molasses. The second method gives a higher yield, which is largest with massecuites of a purity above 80 or below 60. Between 65 and 80 purity the difference is only slight, as has already been observed by practical sugar boilers.

F. W. ZERBAN

**Optical properties of starch grains in polarized light.** J. GILLIS. *Bull. soc. chim. Belg.* 30, 114-9(1921).—A starch grain formed of superposed concentric layers which are distinctly visible produces a "depolarization" of polarized light, except at the points where the tangent of each layer is parallel or perpendicular to the ray of light, and it is at these points that the black bars are observed. The bars intersect at the hilum, where the layers are smallest in size. J. S. C. I.

**Purifying apparatus for starch.** TADAO KIMURA. *Jap.* 39,463, Aug. 5, 1921. Embryos and buds are continuously sepd. from starch from corn or kaoliang by the difference of their sp. gr. in a liquid.

**Clearing waste water and recovering sugar from the pulp press and diffusion waste water and from the fine beet particles of sugar factories.** H. J. N. H. KESSENER. EN N. L. SÖHNGEN. *Holl.* 2094, Aug. 1st, 1917. If waste water contg. large quantities of fine particles, in contradistinction to the small quantities used in the Claassen process (Ger. patent 194046, *C. A.* 2, 1990), is returned to the diffusion batteries, the surprising result is obtained that a heavy flocculent ppt. comes down with complete clarification of the waste  $H_2O$ . The waste water has an alk. reaction and has no effect on Fe; so it can subsequently be used in the place of fresh  $H_2O$  and thus any sugar in it can be recovered.

## 29—LEATHER AND GLUE

ALLEN ROGERS

**Noteworthy work of the years 1916-1920 in the field of the leather industry.** R. LAUFFMANN. *Z. angew. Chem.* 34, Aufsatzteil, 502-5, 509-13, 545-8, 553-7(1921). E. H.

**Durability of sole leather filled with sulfite cellulose extract.** R. C. BOWKER. *Bur. Standards, Tech. Paper No.* 215, 495-500(1922).—See *C. A.* 16, 2617. E. H.

**A possible theory of chrome tanning.** F. C. THOMPSON AND W. R. ATKIN. *J. Soc. Leather Trades Chem.* 6, 207-9(1922).—The apparent contrast between the Procter-Wilson theory of vegetable tanning and the Wilson theory of Cr tanning (*C. A.* 12, 2140) has led the authors to propound a theory of Cr tanning more in harmony with the P.-W. theory. It is suggested that the active constituent of the Cr tan liquor may be the negative ion,  $Cr(OH)_3.CrOCl.Cl'$ , which combines with positively charged collagen, yielding Cr leather. J. A. WILSON

**The direct measurement of the plumping power of tan liquor. 1922 committee report.** V. J. MLERJNEK, *et al.* *J. Am. Leather Chem. Assoc.* 17, 341-8(1922).—Results with solns., within reason, are fairly consistent. Those included are: lactic and acetic acids, Ca acetate, quebracho, oak-bark ext. and syntan. The Clafin method has the advantage of uniform and complete agitation, but the disadvantage of transfer to more than one container. The Reed method is simpler in manipulation but requires a longer time, making close temp. control more difficult. Results by the members of the committee are tabulated. W. H. BOYNTON

**Determination of alkaline sulfides in tannery lime liquors.** F. G. A. ENNA. *J. Soc. Leather Trades Chem.* 5, 131-7(1921).—Ca sulfohydrate, present in lime liquors to which sulfides have been added, oxidizes to Ca sulfide and thiosulfate. Strong acids liberate  $SO_2$  from thiosulfates, and this reacts with the  $H_2S$  giving a low result in the detn. of sulfides. To obviate this the  $H_2S$  is liberated from its salts by boiling in an atm. of  $CO_2$ .  $CO_2$  is passed through a flask contg. a measured quantity of lime liquor, and the  $H_2S$  collected in a measured vol. of standard Cu acetate soln. The pptd.  $CuS$  is filtered off and the residual Cu estd. iodometrically. A blank detn. should be carried out with the Cu acetate soln. Concordant results are obtained with this method. J. S. C. I.

**Contributions to the chemistry and technology of gelatin and glue.** ROBERT HERMAN BOGUE. *J. Frank. Inst.* 193, 795-825; 194, 75-82(1922).—Review. Sections are devoted to the history, technology, economic aspects, and physicochem. properties. JOSEPH S. HEPBURN

**Manufacture of glue from crushed bone.** GG. ILLERT. *Chem. App.* 9, 109 (1922).—A brief description, with 1 cut, of the Ruf diffusion battery. J. H. MOORE

Studies on the treatment and disposal of industrial wastes. III. Tannery wastes (HOMMON) 14.

**Tanning materials from cellulose waste sulfite lye.** A. ROMER. *Can.* 220,399, July 4, 1922. The lye is treated with lime to ppt. the  $H_2SO_4$ , the ppt. is removed and the soln. treated with alkali compds., carbonates or silicates, to ppt. the Ca with the sulfonic acids. The alkali metal lignin-sulfonates formed are then treated with HCl in quantity insufficient to combine with all the alkali metal.

**Tanning with aluminium salts.** O. RÖHM. U. S. 1,421,723, July 4. Hides or skins are tanned by immersion in a liquor contg. 8 kg. K alum, 2.5 kg. NaCl, 500 g. Na formate 10 kg. talcum and 50 l.  $H_2O$  for each 100 kg. hides or skins.

**Apparatus for extraction of glue, gelatin and similar substances.** F. H. TUNNELL. U. S. 1,421,620, July 4. The app. comprizes a tank with perforated false bottom and pipes for circulating the extg. liquid and showering it on the material, e. g., "glue stock" undergoing extn.

**Liquid glue.** KEN KIKUCHI. *Jap.* 39,483, Aug. 5, 1921. Raw or half-dried fish skins or scales (75 kg.) are immersed in 4% NaOH soln. for 20 hrs. below  $25^\circ$ , sepd. from the alkali, boiled for 6 hrs. with  $H_2O$  and then steamed for 2 hrs. under 20 lb. pressure. Glue in about 8% yield is obtained. It is boiled with 20 g.  $CaCl_2$ , sepd. from coagulated impurities and concd.

### 30—RUBBER AND ALLIED SUBSTANCES

JOHN B. TUTTLE

**Rubber in three parts of the world.** O. DE VRIES. *Arch. Rubbercultuur* 6, 176-90 (1922).—A historical review of the development of the rubber industry. R. B.

**Tests for variability.** H. P. STEVENS. *Bull. Rubber Growers' Assoc.* 3, 375-7 (1921).—Comments on an article by Tuttle (*C. A.* 15, 2748). G. S. W.

**Tests on plantation rubber with zinc oxide and litharge mixings.** H. P. STEVENS. *Bull. Rubber Growers' Assoc.* 4, 275-81(1922); cf. *C. A.* 16, 359.—Six samples of slab rubber were vulcanized under identical conditions in the following mixings: (a) 90 rubber:10 S, (b) 90 rubber:10 S:5 ZnO, (c) 100 rubber:6 S:7 PbO. As judged by the relative positions of the stress-strain curves, the order in which the samples fell as regards rate of cure was not affected by ZnO but was affected by PbO; as judged by the magnitude of the S coeff., it was affected by both ZnO and PbO. The differences between the samples in rate of cure were less in mixing (b) and much less in mixing (c) than in mixing (a). The extreme figures for elongation at 60 kgs./cm.<sup>2</sup> were in (a) 729 and 985, in (b) 559 and 730, in (c) 730 and 803, and the extreme figures for S coeff. were in (a) 5.22 and 1.35, in (b) 5.11 and 2.56, in (c) 4.30 and 3.36. G. S. WHITBY

**Experiments with Boehringer's coagulating powder.** W. SPOON. *Arch. Rubbercult.* 6, 140-3(1922).—In order to test the coagulating powder in question, which consisted chiefly of Al lactate, comparative expts. are made: the same latex in one portion is coagulated by means of AcOH, in another portion by the coagulating powder. The type of rubber obtained by the powder is inferior to the one obtained by AcOH in

tensile strength and viscosity; also the vulcanization becomes slower. The unfavorable influence seems to be due chiefly to the  $\text{Al}(\text{OH})_3$ , since lactic acid is as good a coagulator as acetic acid.

R. BRUTNER

**Coagulation of latex with "toddy."** H. P. STEVENS. *Bull. Rubber Growers' Assoc.* 4, 197(1922).—Two samples of smoked sheet coagulated by means of fermented coconut sap behave satisfactorily in vulcanization tests.

G. S. W.

**Partial coagulation.** H. P. STEVENS. *Bull. Rubber Growers' Assoc.* 4, 196-7 (1922).—Further tests similar in character to those already reported (*C. A.* 16, 1337). As before, the differences in vulcanizing properties between rubber forming a first clot and the remainder of the rubber in the latex are only small. The former rubber shows an appreciably higher tensile strength than the latter.

G. S. W.

**The transmission of heat through rubber.** A. LUTTRINGER. *Caoutchouc & gutta-percha* 19, 11367-8(1922).—Data obtained at the National Phys. Lab., London, on the thermal cond. of the new porous rubber, *Onazote*, (cf. *Rubber Age* (London) 2, 208(1921)) in comparison with cork, wool, charcoal and an asphalt-fuller's earth compn. showed that Onazote had a lower cond. than any of the others. A sample of Onazote with fl. 0.112 gave a thermal cond. in cal.-g. per cm.<sup>2</sup> per sec. per cm. thickness per 1° difference in temp. of 0.000085 or approx. 1.5 times that of air, in comparison with a common value for cork, wool, charcoal and asphalt-earth compn. of 0.0011 and 0.0013 for sponge rubber.

C. C. DAVIS

**Factors which influence the formation of the lump.** A. J. ULTYÉ and L. R. DILLEN. *Arch. Rubbercult.* 6, 18-31(1922).—The formation of rubber-lump is not desired, owing to the lower price of lumps as compared with sheets. Increased acidity is known to favor the formation of lumps. The acidity of the latex (juice) increases, while standing, owing to bacterial decompn. In the first hours after tapping it remains const. or decreases slightly, owing to escape of  $\text{CO}_2$ . The author tries, therefore, to drive out the air (and  $\text{CO}_2$ ) by means of  $\text{N}_2$  or  $\text{H}_2$ . This, however, has only a slight influence on the acidity. It is important to have spouts and cups cleaned carefully in order to avoid bacterial action and rise of acidity. Although traces of KCN depress the acidity, owing to its poisonous action and possible chem. influence on the rubber, the authors do not suggest using this substance. The use of soda is preferred.

R. BEUTNER

**Investigations on the occurrence of rubber in *Hevea brasiliensis*.** W. BOBILIOFF. *Arch. Rubbercult.* 6, 62-7(1922).—The "nitrosite" method, used by B. for detg. the rubber content of the bast, is performed in the following way. The rubber is extd. from the bast by means of benzene and pptd. by means of nitrous oxides. On the basis of extensive expts. a definite relation is established between the output of rubber by tapping the tree and the total quantity contained in the bast, the ratio being equal to 0.64 in the middle. The distribution of rubber in a tree at different heights decreases, as a rule, towards the top of the tree. B. also detg. the quantity of rubber per bast-unit which makes it possible to get a better idea of the flow of the latex. As a rule, trees which produce much rubber give a high production per bast-unit and length of cut.

R. B.

